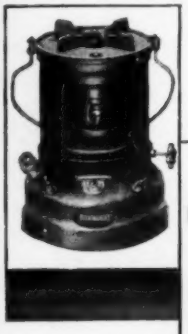
JAN 29 1932

# Telephone Engineer

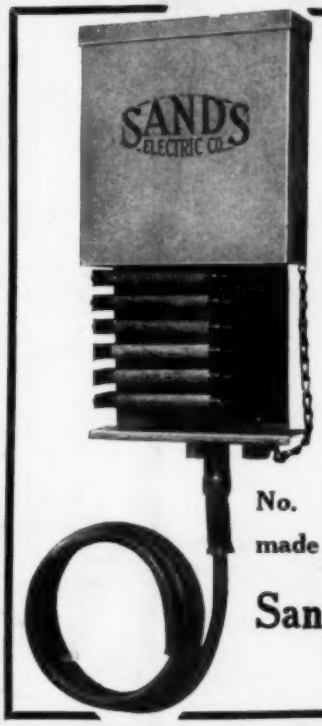



WALL
DREADNAUGHT
BLOW TORCHES AND FURNACES

Designed to withstand roughest usage, delivering maximum heat for long periods of time and operating in windiest weather. Also brazed steel double-jacketed compound kettles. Write about the DREADNAUGHT line.

P. WALL MFG. SUPPLY CO.
3126 Preble Ave., N. S.
Pittsburgh

SINCE WALL SUPERIOR PRODUCTS 1864

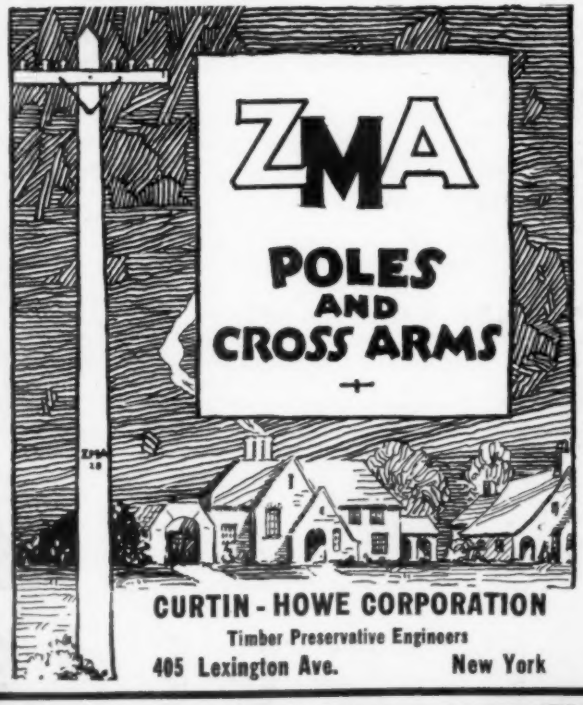



SANDS ELECTRIC CO.

DEPENDABLE
TERMINALS
and
PROTECTORS

No. 40, Protected terminal made in 3 and 5 pairs only.

Sands Electric Co.
North Chicago, Ill.



ZMA
POLES
AND
CROSS ARMS

CURTIN-HOWE CORPORATION
Timber Preservative Engineers
405 Lexington Ave. New York

WB

The Whitney Blake Company
NEW HAVEN, CONN.

SPECIALISTS IN
TELEPHONE WIRE
COPPER—BRONZE—COPPERWELD
DROP—BRIDLE—INSIDE

INSULATION OF RUBBER, COTTON AND WAX TO MEET OUR SPECIFICATIONS WHICH COVER THE LONG LIFE REQUIREMENTS OF THE TELEPHONE INDUSTRY

Domestic Distributors GraybaR 76 Principal Cities

Foreign Distributors
*International Standard Electric Corporation*, 67 Broad St., N. Y. City


JANUARY, 1932

# BETTER SERVING *for* LESS COST

## Neater Down Guy Installations

Kearney Guy Wire Clips are made in six different sizes and of three different materials to meet all construction requirements. They are easily installed with an ordinary pair of pliers or with the special Guy Wire Clip Tool without scratching the strand galvanizing and in one-third of the time required to serve strand ends with waste wire. Write for bulletin 320.

**KEARNEY-CHANCE AND KEARNEY PRODUCTS**

Screw Anchors; Expansion Anchors; Pyramid (cone) Anchors; Plate Anchors; Guying Fixtures; Pole Line Accessories; Solderless Connectors; Cable Ring Saddles; Duct Rods; Sleeve Twisters with Interchangeable Dies; Guy Guards; Hitemeters; Strand Bands; Hi-Strength Guy Clamps.

**JAMES R. KEARNEY CORPORATION**
4224 CLAYTON AVENUE • • • ST. LOUIS, MO.
*Factories:* St. Louis, Mo. • Centralia, Mo. • Taylorville, Ill. • Toronto, Canada

# KEARNEY
# GUY WIRE CLIPS

# INDEX TO VOLUME XXXVI

## January to December, 1932

## TELEPHONE ENGINEER


A

Acid Core Solder Used in Telephone Work, by B. C. Burden, 10-32.
Advertising is Theme of Iowa Convention, 3-35.
Advertising for Independent Companies, 4-32.
"All-Relay" Automatic Exchange Equipment, 3-36.
"All-Relay" Switchboard Purchased for Vermillion, Ohio, 7-34.
A Manufacturer Relates Field Observations, by H. A. White, 10-15.
Analyze Current Problems at Convention, 5-27.
Annual Telephone Handbook Published, 1-42.
Ants Put Four Party Line Out of Service, by Thos. P. Carlyon, 5-38.

B

Barnhart Cites Worth of Association, by Henry A. Barnhart, 6-28.
Barnhart Pleads for Rural Subscribers, by Henry A. Barnhart, 2-25.
Basic Requirements for Development Study by F. J. Dommerque, 1-17.
Blasting the Hole to Set the Pole, by K. H. Williams, 2-28.
"B" Operator's Telephone Grouping Circuit, by John J. Levis, Jr., 2-18.
"B" Position Grouping and Splitting Keys, by John H. Levis, Jr., 6-24.
Burns, Oregon, Also Goes Kellogg, by Frank H. Russell, 9-28.

C

Cambridge City Has Efficient System, by Paul D. Myers, 1-34.
"Caterpillars" Lay A. T. & T. Cable, by H. B. Owen, 6-32.
Change "Depression" to "Press On," 1-41.
Checking in Poles—Causes and Effect, by C. M. Tilley and C. H. Lyon, 8-30.
Coordination of Power and Telephony System, by Frank F. Fowle, 9-15.

D

Developments in Telephone Transmission, by J. W. Keefe, 5-30.
Devotes Ad Space to Unemployed, 8-32.

E

Editorials, 1-15, 2-15, 3-15, 4-15, 5-15, 6-13, 7-11, 8-9, 9-11, 10-11, 11-9, 12-11.
Effect of Depth of Embedment on Pole Stability, by J. F. Seiler, 11-18, 12-16.
Electrical Discoveries of Joseph Henry, by Dr. H. S. Osborne, 9-22.
Elementary Course in Telephone Practice, by O. B. Fensholt, 1-22, 4-20.
Elkhart, Kansas Cuts Over to Kellogg, by W. C. Strehl, 12-25.

F

Fallon, Nevada, Installs Kellogg Equipment, by H. A. Arth, 10-32.
Fifty Ways to Sell a Telephone, by Owen G. Jarboe, 8-25.
Find Water Trouble in Telephone Cables, by E. S. Stewart, 4-40.

G

Group Meetings Supercede Convention, 9-33.

H

Hold That Line! Keep Those Telephones in Service, 11-21.

I

Illinois Holds Annual Convention, 12-32.
Illinois Town Keeps Step with Progress, by H. T. McCaig, 9-30.
Improve Exchange at Groesbeck, Texas, 6-34.
Improve Outgoing End of Trunking System, by John H. Levis, Jr., 4-17.
Independent Pioneers Hold Meeting, 11-13.
Install New Switchboard in Flora, by C. F. Sanders, 4-43.
Inter-Mountain Co. Installs "All-Relay," 2-40.
Introduce Two New Truck Models, 2-44.

K

Keep Telephone Volume from Dropping, by George A. Scoville, 2-17.
Kellogg Introduces New Bronze Drop Wire, 4-38.

L

Littelfuse Goes to Hollywood, 5-28.
Low Capacity Fuses in Telephone Plant, by B. C. Burden, 3-17.

M

Making Successful Test Pole Connections, by T. DeWitt Talmage, 10-18.
Masterbuilt Switchboard Solves Problem, by E. R. Sears, 2-34.
Missouri Convention Well Attended, 12-15.

N

National Group Meetings Attract Interest, 11-11.
Nebraska Holds Thirty-third Convention, 3-19.
New Equipment at Taft, Texas, by P. Winemiller, 12-30.
New Protection for Armour Packing Plants, 10-24.
New "Revenue Builders' Plan for 1932," 5-19.
News from the Field, 1-38, 2-27, 3-44, 4-31, 5-26, 6-36, 7-24, 8-22, 10-26, 11-34, 12-34.
New Telephone Practice Increases Revenue, 10-27.
North Electric Completes New Financing, 1-30.

O

One Antenna Accommodates 3,000 Radios, 7-12.
Oregon-Washington Co. Purchases New Kellogg Masterbuilt Switchboard, 11-39.
Our Engineering and Management Course, by B. C. Burden, 1-19.
Outline to Follow in Planning for Future, by F. J. Dommerque, 4-23.

P

Perfect Outdoor Telephone, 5-42.
Plan to Link 99% of World's Phones, 11-16.
Praise Pioneer Spirit at Texas Meeting, 4-22.
President Bradley Delivers Annual Address at Pennsylvania Convention, 6-23.
Program Service System by Stromberg, 6-32.

R

Ramblings, 3-15, 11-24, 3-42.
Rainier Guy Guards are Attractive, 9-34.
Ralph C. Reno Joins Telephone Engineer Forces, 11-9.
Reconstruction of Shanghai System, by J. Haynes Wilson, MC, 8-10.
Relation of Radio to the Telephony, by R. Manson, 2-37.
Renographs 12-22.
Revenue Tax Bill of 1932, 6-13.

S

Sales Campaign Outlined to Aid Companies, 11-36.
Satisfy Subscriber—Let Him Choose Phone, by H. A. Seamark, 8-32.
Second Annual Southern District Meeting, 6-22.
Some Physical Characteristics of Speech and Music by Dr. Harvey Fletcher, 2-20, 3-20.
Speaks on Taxation and Legislation, by James N. Cox, 7-16.
Speaking Over Radio Made Easier; Tiny Mike Fits Your Lapel, by W. C. Jones, 7-28.
Stromberg-Carlson Equips Waynesboro, Pa., 7-11.
Stromberg-Carlson Equips Wisconsin Town, by C. F. Sanders, 10-28.
Subscribers Wireplant in Toll Center District, by F. J. Dommerque, 8-16.

Sulphur, Oklahoma, to Have New Telephone Exchange, 8-24.

T

Telephone Accounting and Depreciation, by William H. Phipps, 7-30.

Telephone Activities in Foreign Countries, 1-31, 2-29, 3-31, 4-36, 5-40, 6-26, 7-19, 8-15, 9-27, 10-23, 11-17, 12-23.

Telephone News from the Southwest, 1-26, 2-30, 3-28, 4-34, 5-38.

Telephones and Radio at Convention, 7-22.

The Latest Telephone Apparatus Patents, by Ben J. Chromy, 9-18, 10-16, 11-25, 12-24.

The Northern Ohio Telephone Co. Purchases "All-Relay" Automatic for Berlin Heights, 9-26.

These "Wet Joints" are not Joy Makers, Dillon Effects Cure, 12-28.

The Technical Clearing House, by B. C. Burden, 1-28, 2-32, 3-32, 4-29, 5-22, 6-27, 7-26, 8-23 10-25 11-32, 12-21.

The Telephone Receiver as a Test Set, by Ralph J. Sery, 10-34.

Trunkline Wireplant, by F. J. Dommerque, 9-11.

Tonganoxie Switches to Common Battery, by W. C. Strehl, 1-32.

U

Up-State Association Activities are Told, 6-18.

Urge Construction Program at Convention, 2-26.

V

Vacuum Tube Theory and Practice, 3-29, 4-27, 5-17, 6-14, 7-14, 8-12, 9-12, 11-14, 12-13.

Viewpoints from a Manufacturer 11-28.

W

Wisconsin Telephone Rate Cut, 8-18.

With Manufacturers and Jobbers, 1-44, 2-42, 3-45, 4-44, 5-45, 6-37, 7-36, 8-36, 9-36, 10-36, 11-40, 12-36.

**Since 1904 we have been engaged as manufacturers of**

# CORDS

**for all classes of telephone work**

**Lenz Electric Mfg. Co.**

*(Formerly Runzel-Lenz Electric Mfg. Co.)*

**1751-7 N. Western Ave. Chicago**

COOK CABLE TERMINALS

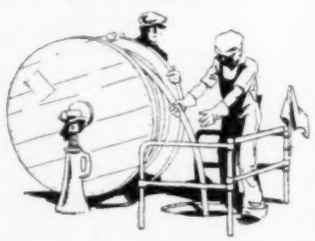
for AERIAL—UNDERGROUND and GAS FILLED CABLE

PROTECTED, UNPROTECTED OR CROSS CONNECTING

30 years of experience in designing and building equipment for terminating, distributing and protecting lead covered telephone cable is at your disposal.

COOK ELECTRIC COMPANY

2700 Southport Ave., Chicago



Buy this book for your Employes

**PUBLIC UTILITIES AND THE PEOPLE**

*By* Henry M. Robinson

For the first time a comprehensive, easily understood textbook on the fundamentals of the public utility industry is now available for your employes.

Public utilities are front page news items. They are being assailed in the Halls of Congress, in Committees, and by politicians.

The more true fundamentals of the business your employes know, the better able they will be to combat erroneous ideas in the public mind.

Let each of your employes become a member of your public relations department by reading this book.

Already used and recommended by a number of Bell and Independent companies.

PRICES: Paper binding..... $ .90
Cloth binding..... 1.50

Special Rates on Quantities

Place your orders directly with

**TELEPHONE ENGINEER**

185 N. WABASH AVE. CHICAGO, ILL.

# Telephone Engineer

Published Monthly by TELEPHONE ENGINEER PUBLISHING COMPANY, 185 North Wabash Avenue

J. A. SMITH, President and Treasurer, 185 N. Wabash Ave., Chicago
C. L. JONES, Vice-President, Athens, Ohio
D. WEINER, Secretary, 185 N. Wabash Ave., Chicago
F. A. BOWDLE, Vice-President, Cerro Gordo, Illinois

E. D. GRAFF, Editor, 185 N. Wabash Ave., Chicago
HAROLD L. BEYER, Vice-President, Chicago

Eastern Representative, H. S. DURLAND, 63 Hinsdale Pl., Newark, N. J.

SUBSCRIPTIONS:—The subscription price of TELEPHONE ENGINEER is $2.00 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries $4. Single copies, U. S. A., 20 cents.

Entered as second-class matter, June 6, 1922, at the post office at Chicago, Ill., under the act of March 3, 1879

Volume 36 JANUARY, 1932 No. 1

## CONTENTS FOR THIS ISSUE

EDITORIALS ..... 15-16
RING OUT THE OLD; RING IN THE NEW—TAXATION—WAGE REDUCTION

BASIC REQUIREMENTS FOR DEVELOPMENT STUDY *By F. J. Dommerque* ..... 17-18

OUR ENGINEERING AND MANAGEMENT COURSE—*By B. C. Burden* ..... 19-20-21

ELEMENTARY COURSE IN TELEPHONE PRACTICE—*By O. B. Fensholt* ..... 22-23

TELEPHONE NEWS FROM THE SOUTHWEST .... 26-27

THE TECHNICAL CLEARING HOUSE—*By B. C. Burden* ..... 28-29

NORTH ELECTRIC COMPLETES NEW FINANCING. 30-31

TELEPHONE ACTIVITIES IN FOREIGN COUNTRIES. 31

TONGANOXIE SWITCHES TO COMMON BATTERY—*By W. C. Strehl* ..... 32-33

CAMBRIDGE CITY HAS EFFICIENT SYSTEM—*By Paul D. Myers* ..... 34-36

NEWS FROM THE FIELD ..... 38

CHANGE "DEPRESSION" TO "PRESS ON" ..... 40

ANNUAL TELEPHONE HANDBOOK PUBLISHED .... 42

WITH MANUFACTURERS AND JOBBERS ..... 44

### Ring Out the Old? Ring in the New

As we grow older, the years seem to come and go with increasing rapidity. It was only yesterday, so to speak, that we rang down the curtain on 1930 and now we have said good-bye to 1931. To many of us, the year just closed has been one of the most important of our lives. Could we have lived the events of 1931 earlier in our lives and permitted ourselves to profit from the lessons learned, we would have been in position to guide our little ship safely through the breakers and perhaps have assisted others less fortunate than ourselves.

Not having been blessed with either the experience or foresight, like many others we have blundered and stumbled our way through and believe that with the New Year we will see the light of a new day in the business world. We will not attempt to discuss the causes of the dark days of the old year. They were numerous but not a single one of those causes could touch the man who did not allow the hysteria of speculation to control his course of action. We can sit at our desk and name dozens of folks to whom the period of depression has only been an opportunity to continue in the even tenor of their way, earning moderate salaries

and spending less than they earn, while we can count dozens of others who were not satisfied with steady savings and plunged to their utter ruin.

Primarily, the telephone business is not a speculative business. Its income is based on fixed rental charges, supplemented by toll charges that can be estimated with a reasonable degree of accuracy, one, two and even three years in advance. The earnings in the telephone field fluctuate less than those of almost any other business and the expenses are likewise practically the same in proportion to the amount of business handled. Because of this the telephone companies now find themselves in an enviable position compared with many other lines of business. When times were good, their profits were not excessive for the same reason that they do not suffer big losses when times are bad. Yet there are ever those who are not satisfied to see the telephone company make any profit at all in times when others are suffering a loss, and it is that class of people that are circulating petitions in an attempt to lower rates, regardless of whether the telephone company is operating at a profit or a loss.

In times past we have found some fault with state utility commissions but just now we feel that these commissions are in position to render a very valuable service in checking the unfair tactics that are being employed in many places to force reductions in rates. Broken down utilities will not lead any community to prosperity and no telephone company is doing its full duty until it has exhausted every means at its command to secure rates that are sufficient to maintain the physical property and pay a fair return on the amount of money invested.

What then have we planned for the coming year? Did we ring out with the old year everything that stood between us and successful operation of our telephone properties?. Did we ring out poor construction and worn apparatus? Did we ring out carelessness and discourtesy? Did we ring out all feelings of hatred and animosity toward those that may have differed from us on questions of policy? Did we ring out from our hearts jealousy toward those who may have succeeded where we failed?

On the other hand did we ring in with the New Year everything in the way of valuable knowledge and experience that we have gained during the past twelve months? Did we ring in for ourselves and for those whose interests we hold in trust a new resolution, not to be broken, to make of the coming year the richest of our whole lives not so much in the dollars gained as in a service well performed? Did we ring in to our own hearts a broader view of life and a more generous spirit toward our brother man? If we have done this, the losses and disappointments of a year that has gone down in history as one of the darkest the financial world has ever experienced, may be so capitalized as to bear fruit and pay dividends for many years to come.

**Taxation** It is rather interesting to note the recent trend of public opinion in regard to taxation as expressed through the press. During the years of prosperity, a considerable number of our municipal, district and state governments, and likewise our national government, had doubled, tripled and quadrupled expenses with scarcely a word of protest from their constituency. Now that values have decreased and incomes lowered, tax authorities are compelled to work overtime in order to devise new schemes of taxation to meet the needs of government. It has been found impossible to rearrange the present governmental machinery so as to operate without a deficit.

In the meantime some of the wiser ones are beginning to ask questions, and when these questions are answered in full, there will be a good many political favorites out of jobs and a good many more will find their salaries reduced to a sum somewhat in keeping with the services rendered.

Those who have interested themselves in the subject are wanting to know why the cost of state government in the forty-eight states has increased from a little over five-hundred millions of dollars in 1917 to more than two billions of dollars in 1929; why the cost of the Federal government increased from $13.50 per capita in 1890 to $105.20 in 1928; why the various county, school, city, and other governments increased their expenditures of the people's tax money in like proportion with the state and Federal governments; why it should be necessary for one person out of every eleven to be placed on some sort of public payroll.

To simply say that it is all a matter of extravagance is not going to be satisfactory. The American public is becoming aroused and will demand a specific answer and along with the answer must come a remedy. The remedy, however, can not come in a day. We have permitted ourselves to be bonded for this thing and that thing and the other, until it will take many years to reach the point where any substantial reduction in taxes can be made, and by that time a new period of prosperity will probably have caused us to lose all interest in the subject.

Perhaps, however, while this subject of taxation is foremost in the minds of the public, it will not be so interested in securing a "two-bit" decrease in telephone rates when such decrease would have to be made at the expense of a fifteen-dollar-a-week telephone operator or a twenty-five-dollar-a-week lineman.

---

**Wage Reduction** During the latter months of 1930 when times began to tighten up in a financial way, it was the general opinion of those high in authority that there should be no cut in workingmen's wages. Opinions on

# Basic Requirements For Development Study

**This Is the Second Article of the Series of "A Development Study of the Toll Center District," by F. J. Dommerque, Fellow A. I. E. E. It Discusses the Grouping of Exchanges in the District, Their Service Requirements and the Factors Entering into Their Annual Expense**

### Preliminaries to a Development Study

As in any extensive business undertaking, so it is in the case of a telephone plant a necessary requirement to intelligently study all the conditions which have to be met by the development of the plant in the course of a period of years and to evolve on the basis of this study a plan, which is to be followed as a guide in the expansion of the plant from year to year. These studies are characterized as development studies and the plan emanating thereof as fundamental plan.

The period which a development study should cover depends more or less on local conditions, but experience has demonstrated that 15 to 20 years is about as good a period as any, because in that time all the important parts of a telephone exchange have terminated their useful life, and have to be renewed. In late years, where often the conditions have changed considerably in short intervals of time, and where such changes have exerted their influence upon the expansion of the plant, it has been found expedient to supplement the long-term development study by one extending over a period of five or ten years only. These short-term studies follow as a whole the same lines with respect to the general characteristics, that is, to industrial, commercial and social conditions, as the long-term studies; they are particularly desirable, where the telephone population in a part of a city or of a district has increased above expectation, or has shifted, demanding a corresponding shift in the planned facilities. In our study of a toll center district this short-term study is of no particular value, whence it may be omitted.

Under present conditions we have to deal with existing small plants which have to be either replaced or rebuilt or regrouped; whence the necessity of acquiring first complete information as to the present status of the plant under consideration. We already have presented the status of the toll center district with respect to the universal telephone system of the United States. We now have to define the character of the telephone exchanges as a group tributary to the toll center. We may divide some into exchanges of the first order and of the second order. Exchanges of the first order are nearest to the toll center and connect directly to it, while exchanges of the second order are farther away and may connect directly to the toll center or to an exchange of the first order.

As there are 2,500 toll centers in the country and as the rural population during the last 20 years has been in a constant turmoil partly through the war and its aftermath, partly through the movement from the farm to the cities and also through the disturbances in the marketing of the products of the soil, it is rather difficult to select a representative group of exchanges tributary to a toll center. Even extreme changes in the regional spheres of rural occupation have contributed to this uncertainty. As it is impossible to make a development for each kind of group we will have to select one, which presents as many representative features as may be found, to serve as a guide in any development study for other group combinations. Such a representative group will be shown later, where the toll center is located at the center, the tributary exchanges of the first order inside a circle of 10 miles and the tributary exchanges of the second order outside the circle of 10 miles.

We will next give a brief account of the service requirements which are not essential to any development study but which are supposed to be lived up to in order to make the arrangement resulting from the development study successful.

### Service Requirements

A development study aims at finding the minimum annual expense involved in giving telephone service of a *satisfactory quality*. This quality demands in the first place a clear and undistorted transmission of speech, so that the talking parties understand each other distinctly; in the second place it demands assurance that the calling subscriber will obtain the desired connection promptly, and that the connection will not be disturbed during conversation.

The transmission quality depends upon the condition of the line, and of the apparatus used for the connection and for conversation. The apparatus problem is fully solved as far as speech transmission is concerned, as the manufacturers have perfected their products to such a degree that they operate with absolute reliability, and the circuits are so designed that they operate with precision and without fail. Thus the entire weight of speech transmission falls upon the line.

As is well known the line possesses four characteristic electric properties, namely: resistance, inductance, capacitance and leakance. These four properties determine the quality of speech transmission. They have to be so proportioned that the attenuation of the talking current passing over the line will not be too great to cut down the current to an amount too small to make the receiver diaphragm vibrate and to reproduce the sound. This means in our problem the "toll terminal losses" must remain inside the prescribed limits.

When saying that the apparatus must assure reliable connection, it does not mean that apparatus must be provided in such quantities that all calls can be taken care of without any delay, no matter how many calls may arrive at the same time; this would be asking too much. What is necessary, however, is that a degree of perfection is assigned, which still permits of "good" service. Such a degree is designated in telephone parlance as the *probability one in thousand*, which means that apparatus must be provided in sufficient amounts so that out of a thousand calls only one cannot be attended to, or cannot be completed. Of course this rule does not pertain to calls for a line which is "busy," but includes all calls which cannot be completed on account of deficiency in ways of connection, or on account of an insufficient number of cord pairs or an insufficiency of trunk lines. There are cases, however, where a probability of $1 \div 1000$ is rather too severe a task and where a probability of $1 \div 100$ or a probability lying between the two may still permit of fully satisfactory service; it would lead us too far to go into this matter more fully.

A prompt connection means that the subscriber must obtain a response from

---

this subject begin to differ now and the word has gone forth to industry to be prepared for the inevitable. Telephone folks have not found it necessary to consider this subject at any great length. Earnings from telephone operations have never permitted the payment of more than moderate wages. Any reduction in wages that could be made, even in times of great stress, would be so small as to make it impossible to reduce rates sufficiently to be of any benefit to the subscribers.

the operator without undue waiting. An answering time of two seconds is fast work; of three seconds is considered good service; a waiting time of four seconds is still acceptable and for small exchanges it may be classed as good service, but if a subscriber has to wait longer than four seconds the service is considered slow. A subscriber, when he hears the voice of the operator promptly, will not become impatient, even in the event that he has to wait comparatively long for the called subscriber to answer.

**Subjects of the Development Study**

The development study has to evolve a fundamental plan which assures a minimum of annual expense for the operation of the plant or group of plants in the toll center district. In order to obtain a minimum of annual expense of the plant of the future, it will be necessary to lay out the plant and then to ascertain its value, so as to be able to fix the interest on the capital required, the depreciation and reserves. In many of the past development studies the line expenses have been omitted, as these development studies had principally for their subject the replacement of an old exchange equipment by a new one, wherein the line was considered a disinterested bystander, as the line expenses remained the same no matter what the exchange equipment was to be. But this is not the case in our problem, or at least in the general problem we have set ourselves, namely to find the most economical arrangement of the toll center district compatible with good service. The toll service plant with its toll centers presents a situation which flavors tandem trunking with its economical advantages which can not be neglected.

In determining the plant value, only in rare cases an entirely new exchange plant is to be reckoned with, and then mostly a rather small one; as a rule existing plants have to be rebuilt or brought up to date. Therefore we have to distinguish between depreciation, which covers the physical deterioration of the plant, and reserve, which is necessary to provide for payments coming due in the future, such as bonded indebtedness, etc. Then there are taxes to be paid, insurance, legal expenses, way-rights and other kindred expenses not directly connected with plant operation, which with depreciation and reserves may be classed as capital expenses.

The operating expenses proper embrace the cost of labor and material directly due to the operation of the switchboard and its accessory equipment. This class of expenses also covers the amount spent annually on the powerplant including current supply; on repairwork; on testing and troublework; on restrooms for the operators; on storage facilities and tools, etc.

In operating expenses are also included the maintenance expenses of the entire plant inside and outside. Furthermore, any moneys expended on experiments, researches, drawings, surveying, which may, however, come under engineering expenses, when the plant is large enough to warrant an engineering department, are included.

It may also be judicial to class rent, light and heat with operating expenses. Of course a distinction must be made between rent, light and heat chargeable to operating, and rent, light and heat chargeable to administration expense.

Under administration expense come the salaries for the officials of the company, their traveling expenses, the expenses connected with bookkeeping, collecting, payrolls, directory, advertising, correspondence, typewriting, printing and office work in general, also minor items such as watch service, cleaning and housework.

It is not said that all of the expenses mentioned above have to be included in a development study such as we have in mind; but they have to be taken in consideration where the total annual expense of a telephone plant is to be ascertained.

**Record of Existent Plant.**

The prime requisite for a development study is a complete knowledge of the present condition of the plant. It may be assumed that in any telephone plant, if ever so small, a record is kept of the initial cost of the plant and the amounts of money spent on it from the start to the present date, so that the value of the plant as it stands at present can easily be determined. But that is not sufficient to serve as a basis for the development study. The existing plant may be in such a condition that it would not fit in with the plans for the future. There is, for instance, the possibility of a change from magneto operation, which still prevails in many small exchanges, to common battery operation. Any change from a magneto board to a common battery board may involve the necessity of reconstruction of certain parts of the plant and consequently may demand an alteration in the present status to make the transformation effective. With local battery for talking and magneto for signaling, the service may be fair, even if the lines are in poor condition; but as soon as common battery is applied, poor wire joints, swinging grounds, defective lightning arresters, insufficient transpositions and similar ailments will make their appearance. Consequently before fixing the value of the existing plant to serve as a basis for the development study, it becomes expedient to make a thorough examination of all lines as to their electric properties. The question immediately arises, whether iron wire is still practicable in line construction. This depends on the character of service desired for the future. The toll service plan allows a certain terminal loss and if toll and long distance service is demanded, this limitation must be taken under consideration.

The best way to start a development study seems to be the preparation of a record in the shape of a large-sized map of the plant, not necessarily to scale, but with the blocks drawn large enough to permit insertion of the number of present subscribers and the number of subscribers expected in twenty years from now. The width of the streets should be exaggerated in order to allow sufficient space for notation of particulars pertaining to cable capacity on poleline or in conduit. These particulars should cover total number of cable pairs and cable pairs in use, gage of conductors, ducts in use and capacity of conduit. It is presupposed that a cable record is on file, giving length of each cable, its capacity, distributing boxes and their particulars. It should also be ascertained whether the electro-static capacity of the cable is still sufficiently high; in fact the entire wire plant should be examined as to its efficiency, and the probable life of the cable itself and of all line material should be ascertained as all this data is essential to a procrastination of the expense involved in replacements during the next twenty years. The map should also show any rivers, railroads, parks and other physical obstacles to running of pole lines and conduits.

Next comes the building question. All buildings should be investigated with respect to their capacity of accommodating future equipment. The floors must be strong enough to carry the weight of the increase in equipment and power plant. The office building must also be examined as to its location, whether it will be at or near the telephonic center; that is, near to the point of densest telephone population, after the twenty years, or whether it would not be advisable to select a more suitable location already at the present time. The future cable requirements and conduits will also have to do with the office location. Sometimes it becomes necessary to increase the conduit capacity; it may then be advantageous to leave the present conduit as it is, and build an additional conduit in another street. All such points are of importance for the development study; but it is not our intention to go in such details now, as they will be discussed in our future elaboration, wherever necessary.

---

The Farmers Mutual Telephone company of Elkader, Ia., spent more than $6,000 for improvements during the past year, according to the annual secretary's report.

---

The stringing of new wires between Alton and Orange City, Ia., has been completed by the West Iowa Telephone company in conjunction with the Central West Public Service company. Three circuits are now in use, instead of the former two circuits.

# Our Engineering and Management Course

**General Features of Desirable Equipment Arrangement in Small and Medium Size Central Offices Are Discussed in This Ninth Installmentof a Course in Telephone Management Construction by B. C. Burden, Transmission Engineer, Lincoln Telephone and Telegraph Company**

### General

Location and arrangement of equipment in central offices is a matter deserving careful study in connection with new offices or where it is desired to improve upon an existing arrangement. There are, of course, a variety of ways in which equipment may be located in a central office building, any of which will permit rendering telephone service. However, there is always some best or ideal arrangement which will prove most satisfactory and efficient over a period of years.

With the larger companies the problem of utilizing existing floor space to maximum advantage and efficiency is a problem delegated to a specialist in this line. Inasmuch as these men spend their entire time making studies on dozens of offices, the small company manager can profitably follow the lead of the larger companies in connection with ideal office arrangements. This section of the engineering and management course deals with the basic consideration involved in planning central office arrangements. Several types of central offices are considered which cover fairly well the usual offices encountered in telephone work. While the arrangements suggested may not fit each specific case they at least point the way.

### Basic Considerations in Central Office Planning

Central office planning intended to produce the ideal layout should keep in mind the following essential considerations, viz.: (1) Future growth; (2) convenience and efficiency from an operating and maintenance standpoint; (3) economical cabling; (4) convenience and appearance from the public's standpoint; (5) economical use of existing space; (6) general overall economy of an arrangement.

Future growth is one of the most important of the considerations in planning central office equipment layouts. It is generally recognized, and especially so in the medium sized and more progressive towns and cities, that the telephone business has not nearly reached the saturation point. Inasmuch as an exchange is constantly adding subscribers, thereby demanding more equipment, and inasmuch as it is not economical to install sufficient equipment initially to take care of the ultimate demand, it is necessary to plan equipment arrangements so that additions may be made from time to time when the demand warrants it. It is therefore necessary and desirable to plan for future equipment additions by installing the initial equipment so that adequate space will be provided for added equipment and so that the symmetry or sequence of an existing numbering scheme will not be upset. Failure to plan for future growth results in an unsymmetrical, awkward and inconvenient equipment arrangement which is usually both costly and unsightly. The three principal items which are primarily involved in advance planning are the switchboard, the main distributing frame, and the relay rack.

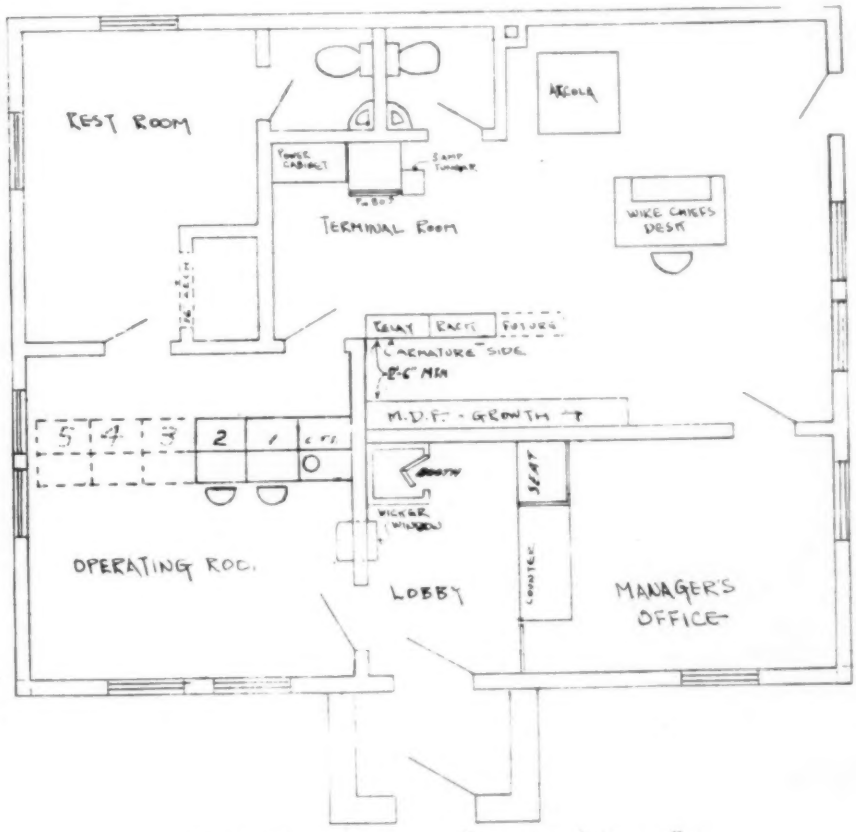



*Fig. 1. Floor plan for small common battery office.*

A second consideration in locating equipment is the convenience and efficiency from an operating and maintenance standpoint. This is a particularly important factor in central office planning and considerable study should be given to the requirements of both plant and operating forces, particularly the operating forces, inasmuch as operators must be constantly on duty and poor arrangement may greatly hamper their efficiency and make for very unsatisfactory working conditions. Good arrangements which satisfy both operating and maintenance forces are discussed in a later paragraph.

The third consideration is cabling between the switchboard, relay rack and main distributing frame, also the line cable run from the central office entrance to the main distributing frame. Because of the relatively high cost of textile insulated cable and cable runway costs it is desirable to keep the cable runs as short as is consistent from the standpoint of the other considerations discussed. One disadvantage besides cost of a long cable run is the difficulty of keeping the cable run clean and the consequent fire hazard which exists in a run extending through several rooms.

The fourth requirement listed, i.e., convenience and appearance from the standpoint of the public, is one which deserves considerable attention, as the public is quick to criticize and condemn central offices which are untidy in appearance or which are not convenient from its standpoint.

The economical use of existing space is dictated both by building costs and the necessity for so locating equipment that

it may be added to without radical rearrangement.

Overall economy of any central office arrangement should take into account both the present and future requirements, inasmuch as an arrangement which might prove quite satisfactory and economical on a present basis, would be decidedly uneconomical, when the cost of rearrangements necessitated by future equipment additions were considered.

### Switchboard, Main Distributing Frame, and Relay Rack Planning

Switchboards of the manual type must be so located that space for additional positions is available either to the right or left (depending on direction of growth) of existing positions. Both toll and exchange growth should be considered inasmuch as toll positions on small boards usually extend in opposite directions from local positions. The direction of growth in manual boards is always in a horizontal direction, however with automatic equipment of the newer type the switch cabinet is arranged for a vertical growth in the same manner as sections are added to a sectional bookcase. Main frame growth is usually provided for in a horizontal direction and the total number of cable pairs that will ultimately be required for some given period should be forecasted and growth space provided to permit additions to the frame being made when required. The desirability of maintaining a uniform terminal numbering scheme should always be kept in mind, also provision for terminating future tip cables to the added MDF sections. Relay racks require the same consideration as the main distributing frames with reference to sequence of numbering and provision for extending cable to the future relay rack sections. Where the initial main frame or relay rack sections are not fully equipped, the initially installed terminal blocks or relay mountings should be placed so as to permit a uniform numbering scheme to be followed.

### Location of Terminal Room Equipment

It is a general practice to locate main distributing frames (of the floor type) in a corner of the terminal room with the line terminal side facing the wall, adequate clearance being provided between the wall and terminal blocks to permit ready access for maintenance reasons. The frame should always be located so that additional sections can be added as required without disturbing the existing numbering scheme. In the smaller offices wall type main frames are often used and this type of frame can best be located on an inside wall.

Relay racks are generally located 2½ to 3 feet from the protector side of the main distributing frame and with the rack extending in the same direction as the main frame. Here again provision must be made for future growth. Cabling between main distributing frame and relay racks is generally placed on overhead iron runways.

The location of the power board and ringing machine is determined largely by the existing room arrangement and dimensions and no hard and fast rule can be laid down for selecting the best location for a power board.

Batteries of the "open type" must always be kept in a closed room properly ventilated by means of an outside vent. In smaller offices this often takes the form of a battery cabinet arranged with a vent leading to the outside of the building and the cabinet being located in a convenient place in the terminal room. Where basement space is available a separate battery room is often desirable. In the newer common battery offices the "glass jar sealed type" central office batteries are becoming very popular and with this type installation the batteries are placed on special wood racks located adjacent to the power board. The location of the wire chief's test board will be governed entirely by the available space conditions and is generally placed in the center of the room well away from the main frame and relay rack. In certain types of offices of the newer type a combined relay rack and wire chief's test desk are used. This arrangement has the advantage of requiring a minimum of cabling between the main frame and wire chief's desk.

### Switchboard Location

One of the first requirements in selecting the location for the switchboard is that it be placed in a room in which minimum street noise and noise from other rooms can penetrate. For this reason a location not adjacent to a busy street is desirable. The switchboard should also be located, where possible, so that the operators' rest room is adjacent

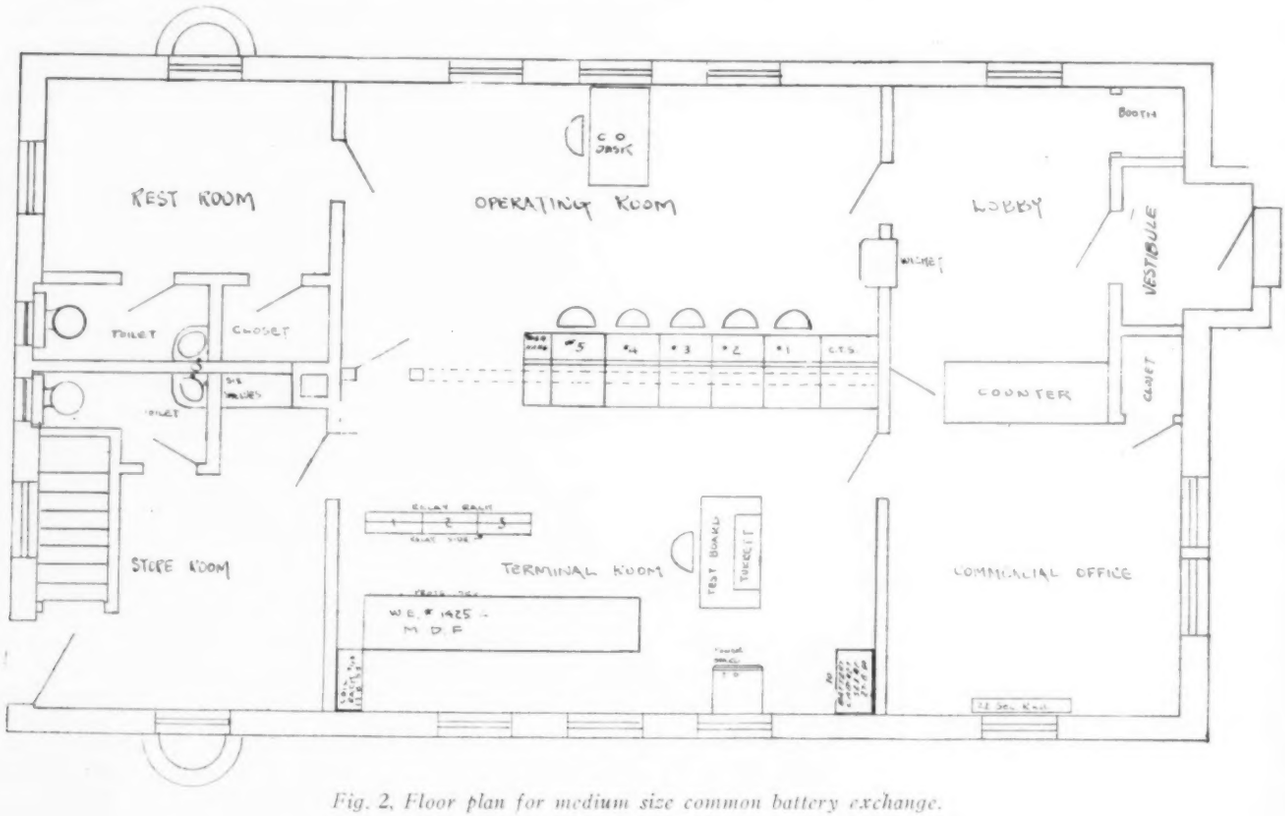



*Fig. 2. Floor plan for medium size common battery exchange.*

to the operating room and so that operators may pass into this room without the necessity of going through other rooms. The board should be so placed that natural light from windows will be thrown against the face of the switchboard. In the small and medium size offices in which operators are expected to take care of commercial transactions in the manager's absence, the operating room should be located adjacent to a lobby which is accessible to both operating room and manager's office and with a wicker window so located that the operator without undue turning is able to command a view or converse with anyone at the window.

An exceptionally convenient and efficient arrangement which can be used to advantage in medium sized offices which have multiple position boards is to have the operating and terminal rooms adjacent to each other and place the switchboard into the separating partition between the two rooms (as shown in Figure 2) so that the back of the board is flush with the terminal room side of the partition. Neat wood trim can be placed around the switchboard to give the appearance of being an integral part of the partition.

False work partition can be provided on the end of the switchboard to which future positions may be added. This arrangement permits the maintenance forces to adjust cord circuit relays and do other maintenance work without the necessity of being in the operating room with the resulting noise and confusion and the inconvenience of having to carry tools from one room to another. This arrangement is most suitable in cases where multiple position boards are used and is generally not feasible with single position boards. Switchboards should be so located that the chief operator's desk may be placed so that it faces the front of the board. Where terminal and operating rooms are located adjacent to each other, a door between the two rooms is desirable. The lavatory facilities for the operating room should preferably be adjacent to and accessible through the operators' rest room. An economical and efficient arrangement in this respect is shown in Figure 1 in which the operators' and men's lavatory facilities are located so as to be accessible from the rest room and terminal room respectively with an intervening partition, this being economical from a standpoint of piping and plumbing required.

### Terminal Room Locations

The most desirable location for a terminal room in one-story central offices is usually towards the back of the building and in the case of corner lots preferably on the street side. Terminal rooms should have an outside door so as to avoid the necessity of outside plant men passing through the commercial office or operating room to get to the terminal room.

### Laying Out Floor Plans

In laying out the floor plan for the small or medium sized central office a plan which is often followed and which enables the engineer to visualize the advantages or disadvantages of a particular arrangement is to lay out on a floor print drawn to scale the amount and location of space to be occupied by various equipment units and desks, using small cardboard cutouts which are cut to proper proportions and which are placed in the approximate locations which are thought to be desirable. The merits of each particular arrangement can then be carefully considered. Care should be taken not to overlook the disadvantages from an operating or maintenance standpoint when considering the advantages to a particular group, that is, a particular arrangement may seem desirable from a maintenance standpoint but may have serious objections on the part of the operating forces. Some of the various factors which affect each group are as follows:

MAINTENANCE FORCES—
- Accessibility of terminal room from street entrance.
- Room light.
- Convenience with respect to lavatory facilities.
- Accessibility to heating equipment.
- Location with respect to cable entrance.
- Access to operating room for maintenance purposes.

OPERATING FORCES—
- Street noise.
- Building noise.
- Room light.
- Convenience with respect to lavatory and rest room.
- Convenience with respect to handling commercial duties.

The foregoing discussion of central office arrangements is not intended to be a treatise on floor plan layouts for the small office, but only a discussion of the general features involved, so that the embryo telephone man may become more familiar with good office arrangements. Figures 1 and 2 show typical small and medium size central office floor plans such as are used by some of the larger companies.

---

## PRAISES PROGRESS OF TELEPHONE ENGINEER

**Dec. 31, 1931.**

**Mr. J. A. Smith, President**
**TELEPHONE ENGINEER,**
**Chicago, Ill.**
**Dear Mr. Smith:**

**The year 1931 is passing out; it was a lean year for the entire world. My sincerest wish is that the coming year may be a better and happier one for your good self and for everybody.**

**Although I do not know that the TELEPHONE ENGINEER has suffered financially, I am sure of one thing, that the paper has kept on progressing editorially, thanks to your own efforts and of those who collaborated with you.**

**With the compliments of the season, I remain**

**Yours sincerely,**
**F. J. Dommerque.**

---

## INVESTIGATE PUBLIC UTILITY HOLDING COMPANIES

A recent dispatch from Washington contains the information that the house interstate commerce committee has approved the Rayburn resolution for an investigation of the stock ownership and financial organization of public utility holding companies.

The resolution deals with the ownership and control, whether through holding companies, investment trusts or otherwise, of public utility corporations engaged in the interstate transportation of power or persons. It also would authorize the committee to investigate the organization and financing of these corporations.

The object of the resolution is said to be to broaden the investigation made into railroad holding companies to include interstate power transmission. It is not intended to duplicate any of the work done on railroads.

Although it does not mention telephone companies specifically, it is known that several congressmen serving on the committee have been eager to conduct inquiries into the management of telephone companies. However, it is satisfactory to know, whenever or wherever such investigations are carried through, the telephone industry has nothing to fear.

---

Aggregate operating income of 103 telephone companies reporting to the interstate commerce commission for the ten months ended October 31, was $231,368,847, against $227,193,049 in the like period of 1930.

---

Expenditures for new plant and equipment to be added to the telephone system in the state authorized by the board of directors of the Chesapeake and Potomac Telephone company of West Virginia will involve expenditures of $373,330. This brings the total authorized for additions to the system since January 1, 1931, to $3,368,138.

---

A new copper telephone circuit costing approximately $4,400 has been placed in service between Sheridan, Wyo., and Ranchester, Wyo., giving the latter community its first direct wire contact with the outside world.

# Elementary Course in Telephone Practice

**Further Facts Concerning Magnetic Poles, the Effect of Electricity Upon Magnetism, and the Right Hand Rule Method of Tracing Out the North or South Pole of an Electro-Magnet, Are Given by O. B. Fensholt in This Eighth Installment of His Elementary Course on the Telephone**

### Magnetic Flux

We have just explained the value of magnetic poles, that is, the difference between north and south poles and their power of attracting or repelling.

Let us try to get a clearer understanding of this power of "push" or "pull."

Magnetism like electricity is hard to understand because like electricity you

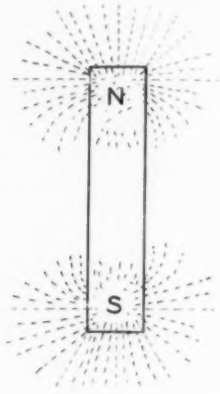



*Fig* 34

can neither see it, hear it, feel it, taste it, nor smell it, but still we must bring in at least one or more of our five senses to prove it.

If we take a bar magnet and place a piece of glass over it and then sprinkle some fine iron filings on the glass and tap the glass lightly we will notice the lines of magnetic force. Figure 34 shows you how this would look.

You will notice that the lines of force are from one pole to the other.

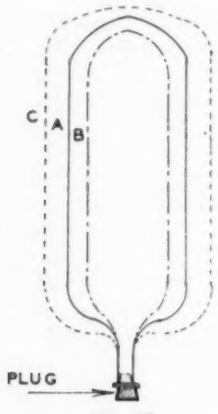



*Fig* 35

These lines of magnetic force should not be confused with electrical force. That is, the magnetism is not a current from the north pole to the south pole, nor from the south pole to the north pole, but rather it is a force between the two poles. The weaker the magnetism the weaker will be this force.

We might demonstrate this a little more clearly by using a toy balloon for illustration. Let Figure 35 represent a toy balloon blown up to a certain height as shown by the heavy line A. If we remove the plug and let some air out or weaken the balloon, the new contour will be like the line B, but if we blow more air into the balloon the contour will be greater or as line C. Therefore the lines of force will vary more or less according to the internal strength or force.

In magnetism, we also have these lines of force. They cannot be seen, but they

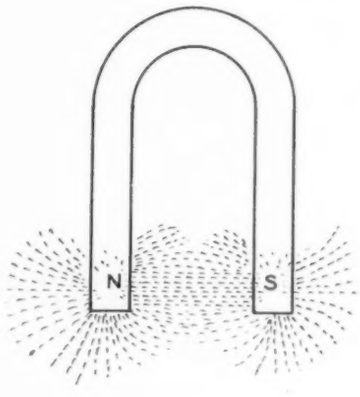



*Fig.* 36

are there. That is, a magnet of a given strength has a given number of lines of force, but if we double the strength of this magnetism we double the lines of force, or we can reverse that statement and say that if we can double the lines of force we can double the magnetism.

To prove this last statement we will look at Figure 34 and note the lines of force of a bar magnet. Then if we take a horseshoe magnet and put it under a glass and sprinkle some iron filings on the glass, you will notice how much thicker the filings are, as shown by Figure 36. This shows that we have more lines of force between the poles when the poles are closer together.

So far we have shown the magnetic lines of force by attraction, but let us see what can repel or cause these lines of force to act against one and another.

Let us place two bar magnets alongside of each other, with the two north poles at the same end. We will again put a piece of glass over our magnets and sprinkle some iron filings on the glass.

Figure 37 will show you how the lines of force will now act. You will notice that about one-half way between the two magnets, at the pole ends, that there is a line with little or no magnetism.

What occurs is that the lines of force, say from the north pole of one magnet start out to meet the lines of force of the south pole of the same magnet, but when it gets out it meets the lines of force of the north pole of the other magnet, and when they meet they want to force one

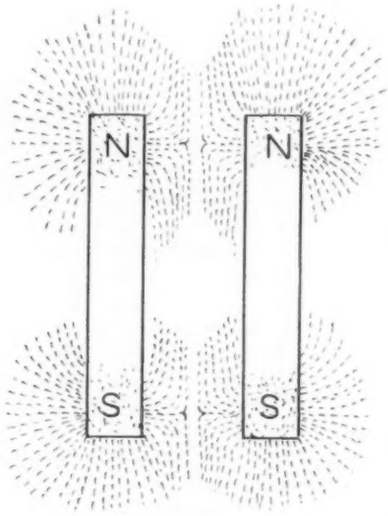



*Fig.* 37

another out of the way to get to their respective poles. In other words, the lines of force at this point have a "pushing" power instead of a "pulling" power. The closer we put these like poles the greater will be the "pushing" power or the act of repelling.

This then shows us that the magnetic force of two like poles repel, while two unlike poles attract.

### Producing Magnetism

Perhaps you have noticed that after you have been using your ringer wrench, screwdriver, bell gauges, or other tools around your ringers for a while these tools have also become magnets, or have become magnetized.

This is caused by rubbing these tools on the permanent magnets of your ringers. A good many years ago it was

discovered that by rubbing pieces of iron on permanent magnets these articles also become magnets. This is caused by cutting the magnetic lines of force.

To make a magnet from another magnet by rubbing, you should rub in one direction only.

Figure 38 will show you what occurs when you do this.

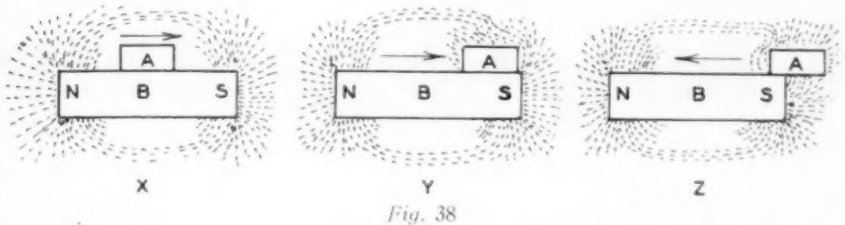



*Fig. 38*

Figure 38X shows a piece of iron, A, laid on magnet, B. The dotted lines represent the lines of force. When the bar, A, is pushed to the right it cuts through the magnetic lines of force as shown in Figure 38Y, which puts some magnetism in bar, A. Now if we should come back on the magnet, B, in the reverse direction, as shown in Figure 38Z, we are again cutting the magnetic lines of force, but this time in the reverse direction, which will remove most of the magnetism we put in the first time. Therefore, always move the bar only in one direction and not back and forth.

We then know that one way to produce magnetism is by using other magnets.

If we take a single wire and put a current through it, it will set up what is called a magnetic field. That is, there will be a magnetic flux around the wire.

Figure 39 represents a wire with an electric current going through it from the top. A magnetic field is then set up around the wire in a clockwise direction, as is shown by the arrows of the four compasses.

If we reverse our current in the wire and send the current in from the bottom, we will also reverse our magnetic field, as is shown by Figure 40. Remember, then, that we can reverse our magnetic field by reversing our electric current. This becomes a big factor in telephone transposition, telephone ringers, receivers, etc.

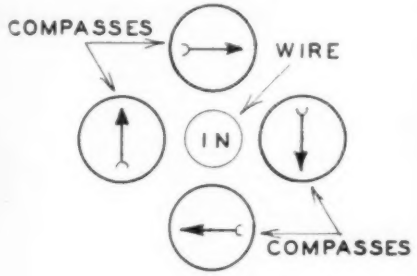



*Fig. 39*

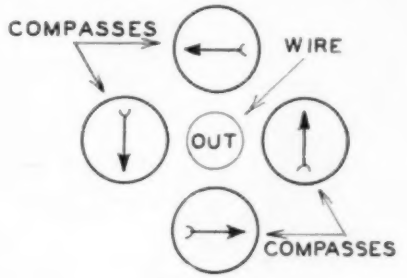



*Fig. 40*

Another discovery was made that if a compass were placed beside a wire, as shown by Figure 41, and if a current was sent through this wire, that the compass would show the direction of the flux in the wire. You will notice in Figure 41 that the current is going through the wire from the top to the bottom, and that the compass is also pointing downward.

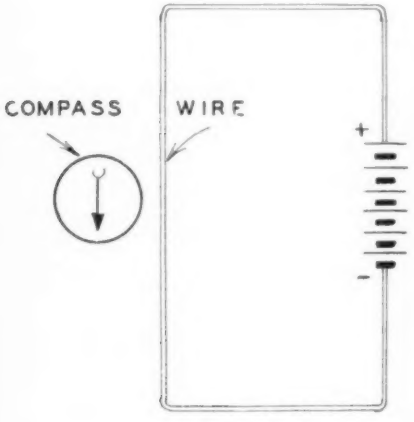



*Fig. 41*

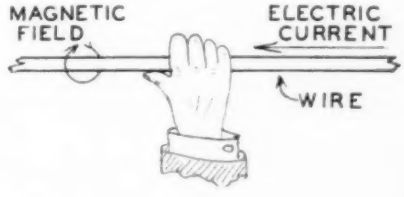



*Fig. 42*

If again we reverse our electric current we then also reverse our magnetic flux.

A method which will aid to remember this rule is known as the "right hand rule."

If you grasp a wire by the right hand so that the thumb points in the direction of the current flow in the wire, then your fingers will show you the direction of your magnetic field in that wire, as is shown by Figure 42. The magnetic flux will always be in the same direction as the current in the wire.

We will now take a bar of soft iron and wrap a coil of wire around this bar and then send a current through the coil of wire. A magnetic field will then be set up around this coil of wire which, we will say, will "enter into" the iron bar, making a magnet out of the bar. This kind of a magnet is called an "electro magnet" because it needs an electric current to maintain the magnetism.

To brace out the north or south pole of this electro magnet, this can be done by using your right hand rule method. Your fingers should point the direction of current through your coil of wire, and then your thumb will point to the north pole of your magnet.

## GET TELEPHONE BUSINESS FROM CONVENTION

How the Southern Bell Telephone and Telegraph company pioneered in a service for 5,000 visitors to the American Dental association meeting in Memphis in October, is told in the December issue of *Southern Telephone News*.

Six weeks in advance of the convention District Manager Frank Flournoy compiled a list of the 437 delegates. A card was sent to each informing him of the long-distance rates at various hours in the event he wished to keep in touch with his home.

With the assistance of Ralph E. Logsdon, convention director of the Memphis Chamber of Commerce, the telephone company was later furnished, through the convention bureau's registration desk, with names and hotel room numbers of the 2,222 attending who were registered at the leading hotels. Each found in his key box a copy of the special rate card.

Results checked showed the card sold 1,389 long-distance calls during the convention. Revenue to the company was $2,103.95.

## BEG YOUR PARDON

An error occurred in the article entitled "All-Relay Dial Automatic Exchange Exhibit" published on page 46 of the December TELEPHONE ENGINEER. In case the wording of a certain sentence proved confusing to readers, it is corrected here.

The sentence containing the error is in the third paragraph line 14. The phrase "seeks out the calling line" should be "seeks out the called line."

# Telephone Service

in terp f

"The Joneses have a new baby"

"WELL, WELL, another boy, and that makes four. Tom'll have plenty of help when they grow up. We must drive over tomorrow and see Ethel."

Thus by telephone come the glad tidings of the birth of a son in a neighboring home. And you are only too glad to wish Tom and Ethel well, for they are good neighbors, ready to extend a helping hand to a fellow when he needs it. You'd go out of your way to help them.

By telephone—that is the way the news of a great many things of importance reaches your home. A telephoned message from your boy at the state university brings gladness to your family. The county agent telephones Jack about a 4H Club meeting. The news of a church social or a community gathering goes the rounds by telephone.

By telephone you are in touch with the world and the world is in touch with you. For only a few cents a day you buy convenience, contacts and security that are frequently beyond price.

A BELL SYSTEM ADVERTISEMENT

**LIVING in a world of his own, the farmer must go beyond its borders for friends and social contacts. The telephone creates such contacts, keeps them alive, and so makes itself invaluable to any farm family.**

**From such a standpoint, the advertisement on the opposite page was prepared. It is part of a series appearing regularly in farm publications. Its headline and illustration dramatize a simple, homely situation. Copy carries on in the same tone, suggesting other incidents in which the telephone plays an important part.** ***And it is sometimes as effective to interpret telephone value in terms of friendship as in terms of dollars and cents.***

**By reminding present subscribers of the value of their service, by attracting new ones, this advertising does double duty for the telephone industry.**

AN ADVERTISEMENT OF THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY

# Telephone News From the Southwest

**Notes of Telephone and Utility Interests in the Central Southwest Which Previously Were Reported for Transmitter and Electrical Journal, a Regional Magazine of that District Which Has Been Absorbed by TELEPHONE ENGINEER, Appear in the Following Columns**

## Tidings From Texas

### Visits Havana

General Manager W. L. Prehn of the Southwestern Bell Telephone company, with his family, spent a holiday vacation in Havana, Cuba.

### Gulf States at Overton

The Gulf States Telephone company, with headquaretrs at Tyler, has completed the installation of a new common battery switchboard at Overton, in the East Texas oil field. The American Electric company, Inc., of Chicago supplied the equipment.

### Huntsville Gets New Board

The Southwestern Bell Telephone company recently cut over to a complete common battery equipment at Huntsville.

### Aransas Pass Christmas Present

The Texas Telephone company has completed its new installation at Aransas Pass. The central office equipment is American Electric common battery and was cut into service on December 22.

### Company Gets Restraining Order

Following the passing of an ordinance setting up rates approximately 20 per cent below those now being charged, the Texas Utilities company secured an order restraining the city of Floydada from enforcing the ordinance. The Texas Utilities company serves patrons in fifteen Panhandle counties besides several towns in New Mexico. Counsel for the company claim that the Floydada property has earned only 1.9 per cent during the last twelve months.

### Sale of Service Banquet

During the latter part of the year the employees of the Northern Texas Telephone company at Sherman were divided into two teams for the sale of service and securities. The winning team was to be given a turkey dinner while the losing side was to be served beans. The team headed by Mrs. Ova Stone, chief operator, won the contest. The dinner was served at the Grayson Hotel on January 2, and while members of the winning team were being served turkey according to schedule, the losers, headed by Wire Chief Jeff Sutherland, were served beans which they proceeded to dispose of to the best of their ability. However, General Manager Sam H. Shutt relented and ordered that turkey be served the losers as well as the winners. After the banquet a program of music and oratory arranged by Local Manager Karl Shock was enjoyed. The results of the sales campaign were very satisfactory.

### Rebuilding at Whitney

The Standard Telephone company is engaged in completely rebuilding its exchange at Whitney.

### Andy Edmondson Ill

Andy L. Edmondson, formerly general manager of the Texas Telephone company at Waco, and more recently division commercial superintendent of the South Texas division of the Southwestern Bell Telephone company, is recovering from a serious surgical operation.

### Hear from Jack Bridgman

Word has been received from Jack Bridgman that he has arrived safely in Colombia, South America, where he is engaged in the telephone business. Jack was formerly general plant superintendent for the Texas Telephone company at Waco. He advises his friends that he now lives in the mountains and visits the several telephone exchanges in his charge by airplane.

### Power Company to Receiver

On January 1, Federal District Judge James C. Wilson of Fort Worth appointed A. P. Barrett of Fort Worth and Wiley F. Corl of Philadelphia as receivers for the Texas-Louisiana Power company and its eleven subsidiary companies. The various enterprises in which this company was interested consisted of bottling works, gas, electric, water, sewer, street railway, bus, dairy products and ice. The assets are given as $30,000,000 with unsecured debts amounting to $2,700,000. The holding company is a Delaware corporation with headquarters in Fort Worth.

### The 1932 Convention

L. S. Gardner, president of the Texas Independent Telephone association, announces that the 1932 convention will be held at Forth Worth on March 22, 23 and 24. As has been the case for several years the convention will be held at the Texas Hotel.

## Observations From Oklahoma

### Last District Meeting

The last of the 1931 series of district meetings, telephone division, Oklahoma Utilities association, was held at Okeene, December 8. C. G. Gardner, Oklahoma City, chairman of the telephone division, presided. Another district meeting had been planned for Guymon on December 10, but incessant rains had made many highways impassable and the meeting was indefinitely postponed.

Attendance at the Okeene meeting was reduced on account of the bad weather, but an interesting and worthwhile meeting was held in spite of this handicap. The program was put on in the high school auditorium, beginning with a noonday luncheon which was attended by about eighty persons, including members of the Okeene Kiwanis club. The principal address was delivered by W. D. Asfahl, principal of the Okeene High school. R. J. Benzel, Oklahoma City, general manager Southwestern Bell Telephone company, and other telephone experts discussed various phases of their industry.

The telephone division of the association has held meetings during the year in practically every section of the state except in the extreme northwestern part where the Guymon meeting was to have been held. These district meetings have been a feature of the work of the Oklahoma Utilities association each year since 1922. They have enabled small independent telephone company executives and employees to meet with others engaged in the industry and exchange ideas with little expense or loss of time, and have proven a great benefit to the telephone industry. In recent years the noonday

luncheons have been held in connection with some local commercial or civic organization, enabling the telephone people and their patrons to become better acquainted and to more fully appreciate their mutual problems.

### New Telephone Exchange Service

The Southwestern Bell Telephone company has opened its new telephone exchange service for Hartshorne and Haileyville. A new brick building, installation of a new switchboard and other equipment have recently been completed in Hartshorne to handle the service for both towns. Several months ago the Southwestern Bell Telephone company purchased the Haileyville exchange and decided to consolidate the service for both towns through one exchange as Hartshorne and Haileyville lie adjacent to each other.

### Improve Beaver Exchange

The Standard Telephone company has made improvements to its exchange in Beaver, Okla., and also has announced that it will build a direct toll line between Beaver and Perryton, Texas.

### Fourteenth Convention at Tulsa

Arrangements have been made for holding the fourteenth annual convention of the Oklahoma Utilities association at Tulsa, Okla., March 8 and 9, 1932, according to E. F. McKay, Oklahoma City, manager of the association. The place and date of the meeting have been approved by the executive board of the association. In recent years the annual conventions have alternated between Oklahoma City and Tulsa. Practically all branches of the public utility industry will be represented in the convention, including the telephone, electric light and power, gas, electric railway, and manufacturers' and suppliers' industries. Committees which will arrange the program for the convention will soon be announced by President S. I. McElhoes, Oklahoma City, vice-president, Southwestern Light and Power company. As in former years, the telephone division will hold division meetings on each of the two days and will put on a varied and interesting program.

### Vern District Receives Tulsa Rates

Through an order of the Oklahoma Corporation commission the Vern station district was given the benefit of the local telephone exchange rates of the Southwestern Bell Telephone company which apply to Tulsa. A reduction was also made in the station-to-station rates for toll service between Sand Springs and Tulsa from 10 to 5 cents. The Vern district lies between Tulsa and Sand Springs and was formerly a separate community but now is a part of the city of Tulsa. Some of the residents of Vern filed an application with the corporation commission asking for suspension of the toll rate between Vern and Tulsa and inclusion in the Tulsa exchange area. This was agreed to by officials of the Southwestern Bell Telephone company and approved by the Oklahoma Corporation commission. The rates became effective on December 16.

### Murray Appeals Bell Ruling

Charles West of Oklahoma City, former attorney general, has been appointed by Gov. William H. Murray to conduct the appeal of the state to the Oklahoma Supreme court from the ruling of the district court, which sustained the demurrer of the Southwestern Bell Telephone company to the suit brought by Governor Murray seeking to collect $644,000 in fees and penalties from the telephone company. The demurrer was sustained in the district court on the ground that the law under which the fees are sought to be collected is unconstitutional.

### Electric Clocks for Welch Exchange

The Welch-Bluejacket Telephone company has installed in its exchange at Welch, Okla., a new electric clock in order to tell its patrons the correct time when requested.

### Utilities Pay Dividends

Directors of the Western Power, Light and Telephone company have declared the regular quarterly dividends of $1.75 per share on series A, 7 per cent preferred stock and $1.50 per share on series B, 6 per cent preferred stock. Both dividends were paid January 1 to stockholders of record December 15. Directors of the Public Utilities Investment company have also declared the regular quarterly dividends of $1.75 per share on 7 per cent preferred stock to holders of record December 15.

### Customer Ownership Campaign

The Associated Telephone Utilities system, composed of local telephone companies serving 1,980 cities and towns in 25 states and operating in Oklahoma, recently conducted a customer ownership campaign. Managers of the properties in Oklahoma announce that there was a satisfactory demand for the stocks of the company among their customers. The stock was distributed exclusively through local employees.

### H. N. Faris Ill

Harry N. Faris of Abilene, Kans., dean of the telephone fraternity in the Southwest, is in an Oklahoma City hospital in a serious condition as a result of a stroke suffered December 28 while visiting in Oklahoma City en route to San Antonio where he hoped to recuperate his strength.

Mr. Faris was identified with the establishing of telephone service in a large majority of cities of Oklahoma and adjacent states, being for many years field representative of the Kellogg Switchboard and Supply company. About five years ago he resigned this connection and has since resided in Abilene as consulting engineer with the United Telephone and Electric company. Mr. Faris has attended and addressed several conventions of the Oklahoma Utilities association.

### Transmits Postal Telegrams

An arrangement has been completed between the Western Power, Light and Telephone company of Salina, Kans., and the Postal Telegraph and Cable company for the acceptance and transmittal of Postal messages at 49 of the exchanges of the telephone company where the Postal has no offices. The contract, which became effective January 1, provides that messages will be telephoned to the nearest Postal office by the Western Telephone company or other subsidiary; these companies to receive a share of the message fee for their services. The arrangement will materially extend the scope of Postal telegraph service and add to the revenue of the telephone companies, in addition to affording added convenience to the public.

## EXHIBIT EARLY WRITINGS OF EDISON

Early writings of Thomas A. Edison are on exhibition at the Engineering Societies' library, 29 West 39th street, New York. The existence of many of the exhibits, prophetic of the inventor's future triumphs, was unknown even to Mrs. Edison, who inspected the display under the guidance of Harrison W. Craver, director of the library.

"Dangers of Electric Lighting," an article by Mr. Edison, which appeared in the North American Review of December, 1889, youthful pictures of Mr. Edison, and copies of some of his writings and addresses are shown.

One of Mr. Edison's first phonograph records, a rectangular piece of tinfoil in use in 1878, is displayed, as well as a manuscript written by the inventor in longhand on rough tablet paper which contains instructions for the operation of an incandescent lighting system.

The Associated Telephone Utilities company, owner of the telephone exchanges in 29 Indiana towns, has placed 5,000 shares of no par value common stock on the market for purchase by individuals in the communities where the exchanges are located.

# THE TECHNICAL CLEARING HOUSE

B. C. BURDEN, Editor

### Murray and Varley Loop Methods

Q.—What is the chief difference between the Murray and Varley loop methods used in the location of cable faults? Which is the most accurate?

A.—The chief difference between the two loop methods is in the method of balancing the bridge. The Varley method involves the use of a fixed ratio between the A and B arms with the X arm consisting of the resistance of all the good wire and the portion of the bad wire from the strap back to the fault, and the R arm consisting of the rheostat in series with the resistance of the bad wire from the bridge to the fault. The bridge is balanced by adjusting the rheostat. In the Murray method a fixed resistance in the A arm is used, the rheostat is substituted for the B arm and the X arm consists of the good wire plus the resistance of the bad wire from the fault to strap, and the R arm consists of the resistance of the bad wire from bridge to fault. The bridge is balanced by varying the rheostat which in effect varies the ratio between the A and B arm. The two methods are equally accurate, the Varley method is more commonly used however. Figure 1 illustrates schematically the difference between the two methods.

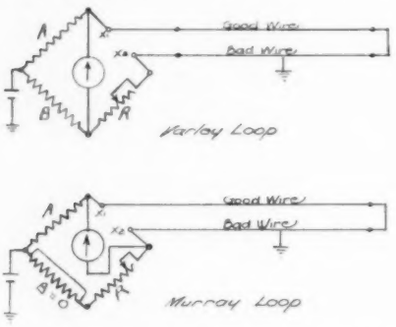



*Fig. 1, Varley and Murray loop methods.*

### Receiver Gauge

Q.—Please give the dimensions for a receiver gap gauge useful for gauging permanent magnet type receivers.

A.—The dimensions for a receiver gap gauge having a clearance of 0.015 of an inch between pole face and diaphragm is shown in Figure 2. Such a gauge can be made from 1/16-inch brass or steel stock.

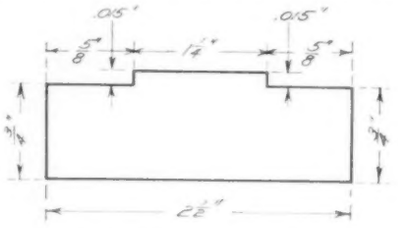



*Fig. 2, Receiver Gap Gauge.*

### Cleaning Relay Contacts

Q.—What is a good method for cleaning relay and key contacts?

A.—The standard method that is ordinarily used and which we recommend consists of applying a drop or two of carbon tetrachloride to the contact to be cleaned, using the point of a toothpick. Next saturate the flat end of the toothpick with carbon tetrachloride and insert between the relay contact. The toothpick should be pulled back and forth several times while applying light pressure against the closed contact. This softens any dirt or grease film that may be present. After the dirt on the contacts has been loosened and partially cleaned they should be flushed off with a drop of carbon tetrachloride picked up on the other end of the toothpick. A clean toothpick should be used on each set of contacts. Carbon tetrachloride evaporates quickly and will not corrode the springs or contacts. It should not be allowed to get on the rubber bushings, however, as

## LIGHT AND POWER TO SPEND $450,000,000

Realizing the greatly increased purchasing power of the dollar over several years ago, and probably over several years hence, electric light and power companies in the United States have announced their intention to spend $450,000,000 for expansion and improvement in 1932, according to a survey completed recently by the *Electrical World*.

The budget is about 28 per cent less than actual expenditures in 1931, due principally to a drop in construction of generating plants.

More than half of the expenditures scheduled this year will be for extensions and improvements of local service, which will be $203,000,000, about $55,000,000 less than expenditures for distribution systems and substations in 1931. Transmission construction projects will involve $55,000,000 this year, against $61,000,000 last year.

Total revenue of the electric light and power industry in 1931 was $2,137,000,000, of which $1,977,000,000 came from the ultimate consumers of electricity. The total is 0.7 per cent below 1930, but 1.5 per cent higher than 1929, according to the survey. Of total income $695,000,000 came from domestic customers and $568,000,000 was realized in retail commercial sales. Wholesale light and power was $554,000,000.

Electrical service reached 24,676,000 customers and 20,441,000 homes in 1931, a gain of 120,000 in number of customers. The industry also served 3,613,000 retail commercial and 622,000 wholesale customers. In addition it was estimated a year ago that 644,000 farms, or about 10 per cent of the total number, had electric connections, and the count was growing then at the rate of 100,000 annually.

The program for the year 1932 as planned by electric light and power companies is interesting in that it shows that utility's belief in the future and its expenditure of large sums now, when prices are universally down. Doubtless the telephone industry will spend a similar or larger sum for construction and improvements in 1932.

## APPOINT NEW CHAIRMAN OF WOOD POLES COMMITTEE

Dr. R. H. Colley, of the timber products section, outside plant development department, Bell Telephone laboratories, New York, has been appointed chairman of the sectional committee on wood poles (05), functioning under the procedure of the American Standards association. The appointment was made by the telephone group, including the Bell Telephone system and the U. S. Independent Telephone association, which is sponsor for the project.

Dr. Colley succeeds R. L. Jones, Bell Telephone laboratories, New York, who had served as chairman of the committee since 1928. During Mr. Jones' chairmanship, specifications and dimensions for the following species of wood poles were approved as American Standards:

Northern White Cedar poles.
Western Red Cedar poles.
Chestnut poles.
Southern Pine poles.

it may have a somewhat injurious effect if applied frequently.

### Pole Gaining

Q.—What does the term "gaining" include, and what is the correct method for gaining a cedar pole?

A.—The term "gaining" as it is generally used implies the cutting of the face of the pole for crossarms and the

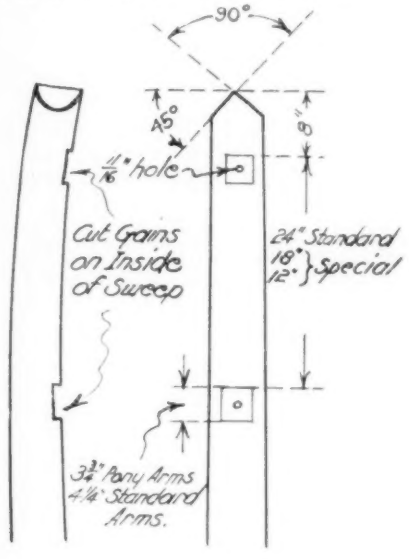



*Fig. 3, Pole Gaining*

boring of a hole for the crossarm through bolt. The gain consists of a rectangular notch from ¼ to ½ inch deep, of the same width as the crossarm. In gaining a pole measure down 8 inches from the apex of the roof for the top side of the first gain, then mark the lower side of the gain for the arm to be used. This

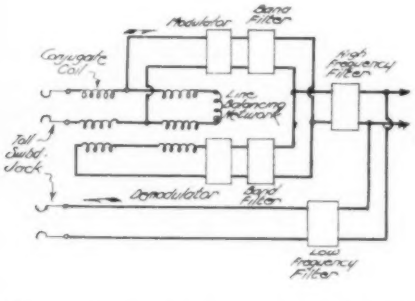



*Fig. 4, Schematic diagram of one channel carrier telephone circuit.*

should be 4¼ inches for standard arms and 3¾ inches for pony arms. Then make a shallow cut not more than ½ inch deep at right angles to the axis of the pole. Using a large wood chisel, chisel out wood between saw cuts so that the recess will be slightly concave, as this will prevent the arm from rocking. Figure 3 illustrates the correct method of roofing and gaining poles.

### Carrier Current Systems

Q.—What are the lowest and highest frequencies used in carrier current systems and how are the carrier frequencies kept out of the voice equipment at terminal points?

A.—The range of frequencies used on common types of carrier systems extend from 6,000 to 30,000 cycles, and carrier frequencies are kept out of voice equipment by means of band pass filters which offer high impedance to frequencies above 3,000 cycles. Figure 4 illustrates schematically the terminal arrangement of a one-channel carrier telephone circuit.

### Cable Splicing Materials and Tools

Q.—Please give us a list of materials and tools which you would consider necessary for a cable splicer's kit.

A.—Tools and materials for cable splice kit:

| *Item* | *Use* |
|---|---|
| Paraffin | Boiling out-splices. |
| Plumbers' candles | Covering cleaned surfaces of cable sheath and sleeves prior to wiping the joints. |
| Cotton tape, 1-inch size | Used to protect conductors at ends of sheath opening. |
| Cotton sleeves | Used to insulate the conductor splices. |
| Muslin | Used to wrap the completed splice before the sleeve is placed. |
| Paper pasters | Used to keep solder from adhering, except where desired. |
| Lead sleeves | Used to cover the opening in the cable sheath. |
| Solder | Used for the wiped joints and for soldering seams. |
| Cable splicing platform | Used in splicing aerial cable. |
| Hand line and single sheave pulley | Pulling tools and material up to platform. |
| Tag boards | Used in identifying conductors. |
| Sheath splitting knife | Used in opening cable sheath. |
| Shave hook | Used in cleaning lead surfaces prior to wiping joints or soldering. |
| Boxwood dresser | Used for shaping lead sleeves down against cable before wiping ends. |
| Cable scissors | Used in splicing conductors, for removing insulation, cutting wire, etc. |
| Tone | Used in identifying cable conductors and testing for trouble. |
| Furnace and melting pot | Used for heating paraffin and lead. |
| Kettle and ladle | Used to hold hot paraffin. |
| Wiping pads | Used in wiping the lead joints. |
| Gasoline torch | Used in heating joints on old sleeves so solder can be removed, etc. |
| Canvas cloths | Used in covering the splice temporarily. |

## NORTHERN WHITE CEDAR ASSOCIATION MEETS

The 36th annual meeting of the Northern White Cedar association will be held at the Hotel Radisson, Minneapolis, Minn., Tuesday and Wednesday, Feb. 2 and 3, according to an announcement received from Norman E. Boucher of Minneapolis, secretary of the association.

## 1931 EXPENDITURES EXCEED PAST FIVE YEARS

Continuing throughout 1931 its program of construction and improvement, the New York Telephone company, according to a review issued this month by J. S. McCulloh, president, spent approximately $85,000,000 during the year for plant additions, betterments and replacements in its service territory, comprising the state of New York and Greenwich, Conn. About three-quarters of this sum was expended in New York City. The total expended in 1931 exceeds the annual average expended for these purposes in the last five years, which amounted during that period to nearly $417,000,000.

Major expenditures of the 1931 program were approximately $29,779,000 for subscribers' equipment, $26,696,000 for central office equipment, $17,708,000 for exchange and toll lines, and $10,181,000 for land and buildings.

A notable feature of the year was the installation and opening of the teletypewriter system connecting all state police stations in the state. It includes 86 machines, 6 switchboards, and 3,400 miles of circuits. Connection with all previously established municipal and county police teletypewriter systems provides facilities for communication among about 300 stations. The New York system is also connected with others in New Jersey and Pennsylvania.

## CONVENTION SCHEDULE

Minnesota Telephone Association, Radisson Hotel, Minneapolis, January 26, 27 and 28.

Nebraska Telephone Association, Hotel Paxton, Omaha, February 9, 10 and 11.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, Iowa, February 24, 25 and 26.

Texas Independent Telephone Association, Texas Hotel, Fort Worth, March 22, 23 and 24.

South Dakota Telephone Association, Sioux Falls, April 6 and 7.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 12, 13 and 14.

Kansas Telephone Association, Jayhawk Hotel, Topeka, April 19, 20 and 21.

# North Electric Completes New Financing

**Rearrangement of Stock Issues of North Electric Mfg. Co. Gives It Exceptional Character in This Period; Company Organized in 1918 by F. R. McBerty, Now President, and K. B. Miller; Concern Active in Automatic Telephony; Helped Form and Finance Automatic Telephones, Ltd., England**

Mr. F. R. McBerty, president of the North Electric Manufacturing company, reports that the changes in financial and capital arrangements of the North Electric Manufacturing company, upon which the officials and attorneys of the North company have been working through the last two years, have now been completed. These alterations put the North company in a condition of stability and security, which has attracted attention because of its exceptional character in this period of financial loss and instability and of uncertain control.

The North Electric Manufacturing company was organized in 1918 by Mr. McBerty and Kempster B. Miller, to take over the plant, patents, and business of the North Electric company and the Telephone Improvement company. Mr. McBerty's long connection with the Western Electric company up to the date of participation in the organization of the North company and his numerous contributions to the development of the telephone art, and particularly to the construction of automatic exchanges, and Mr. Miller's activities in the Independent Telephone field with the Kellogg Switchboard and Supply company and his contributions to the literature of telephony, are well known to most persons amongst the Independent and Bell interests in America and those in foreign countries.

The North Electric Manufacturing company's capital and financial structure has comprised first preferred stock, of $100 par value, issued to the number of 8,546 shares, second preferred stock, of $10 par value, in the amount of 17,422 shares, common stock of par value $5, in the amount of 10,000 shares, and an issue of seven per cent, ten year bonds dated November 30, 1921.

### New No-Par Common Stock

By an action of the stockholders taken January 29 of last year arrangements were made for converting all the outstanding shares of stock of the various classes into a new no-par common stock, of which an issue of 300,000 shares was authorized. The conversions were in the ratio of 20 of the new no-par common shares for one first preferred share of $100 par value, two of the new shares for one of the second preferred shares of $10 par value, and two and one-half of the new shares for one of the old common shares of $5 par value; and resulting in 230,000 shares of the new stock outstanding. These conversions of stock brought advantages which appealed to the various classes of stockholders both as furthering the interests of the company and as being beneficial to them individually.

The holders of first preferred stock who had contributed the funds which made the organization of the company possible, improved their control over the company's affairs and their participation in future profits; the holders of second preferred shares, which carried no voting power and ranked after the first preferred shares in respect to both dividends and assets, acquired an equal right with other stockholders in the participation and control, but give up a certain obstructive strategical position growing out of the relatively large number of such shares; holders of common stock, the majority of whom were also holders of first preferred stock, had the satisfaction of seeing the company's capital position and control greatly simplified and improved.

### Company Status in Harmony with Ohio Statutes

These operations were carried out by Mr. McBerty, in conjunction with the company's attorneys, Messrs. Garfield, Cross, MacGregor, Daoust, and Baldwin, and transformed the company's capital status from one having a rather difficult relation to the new corporation statutes of Ohio, into one in complete and advantageous harmony with the new statutes, in the drafting of which Mr. Daoust had been an active participant.

The North company owns one of the three groups of patents which dominate the field of automatic telephony in the United States. Amongst them were a number of patents of primary importance, including a patent covering fundamental features of the Panel Type exchange designed by the Western Electric company for the American Telephone and Telegraph company, patents covering the generally used metallic circuit operation in Dial Automatic Systems, patents on call distribution to operators in Semi-Automatic Systems, and patents on the North company's "All-Relay" system. In 1921 the North company entered into an exchange of licenses with the two other holders of groups of patents in automatic telephony, the Western Electric company and the Automatic Electric company, which enabled it not only to add to its financial resources but to acquire complete freedom to manufacture its various types of automatic exchanges and allied apparatus. In connection with this operation and for the purpose of enabling it to expand and stabilize its business it created and distributed the issue of bonds.

### Company Bought Bonds Above Par

The issue of bonds matured on December 1, 1931. Interest had been paid by the North company without default through the entire period, the bonds having been accorded a high status amongst investors. About two years ago the company began buying in the bonds, and up to the period of maturity continued to do so, paying a substantial premium above par for them and on these terms acquiring rather more than half of them prior to maturity. In August of this year, having in view the uncertainties of financial circumstances, the company created with the Midland Bank of Cleveland a trust fund covering the balance of the bonds, the interest due, and the expenses for retirement and cancellation of bonds and mortgage. On December 1, the conditions of the trust were fulfilled and the mortgage was cancelled. This operation was carried on out of the company's earnings and without recourse to any refunding, leaving the company free from debt, other than short term current items, and with ample working capital.

During this period of growth and consolidation of its interests the North company and Mr. McBerty have been carrying out a program of contributions to telephony and kindred industries of marked importance. In 1919 they entered into arrangements with the General Electric company, Ltd., of London (Peel Connor Telephone Works) for the formation and financing of a company known as "Coventry Automatic Telephones, Ltd.," in England, for manufacturing and distributing automatic telephone exchanges in England, other European countries, and the British colonies, excepting Canada.

Mr. McBerty served as consulting engineer for the British company. Under this arrangement the North company supplied from its factory at Galion large dial automatic city exchanges for the cities of Dundee and Braughty Ferry in Great Britain, and for Delhi, Nagpur, and nearly a score of other cities in India. Fifteen of the city exchanges in India were Dial Automatic "All-Relay" exchanges of the type now being widely put in to service by the North company in the United States. The largest of these dial automatic "All-Relay" ex-

changes carries 600 lines and ties into a network of seven others operating over trunk lines up to 90 miles in length. These exchanges are operated by the government of India, and have been working successfully for about seven years.

### Manufactures "All-Relay" Exchange Equipment

The "Coventry Company" developed into an extensive supplier of automatic exchanges to the British and Colonial Governments.

The North company also closed a contract with the Westinghouse Electric Manufacturing company under which the North company manufactures its "All-Relay" exchange equipments exclusively for the Westinghouse company for remote control of large power stations and systems, the Westinghouse company buying this equipment exclusively from the North company; the two companies cooperate in the development of circuits and apparatus for power-control systems and under this arrangement the Westinghouse company has attained a premier position in this field. The Westinghouse company has put into operation about 200 of these "All-Relay" equipments.

An arrangement was brought about by the North company with the Teleregister company of New York, a subordinate unit of the Western Union Telegraph company, under which the North company makes the stock quotation equipments rented to stockbrokers for working with leased wires of the Western Union systems and maintained by the Western Union company. These Teleregister equipments also are of the North company's "All-Relay" type. At the same time the North company has installed a number of its well known Auto-Manual systems, a large number of its "All-Relay" remote control satellite equipments (without dials) and some 400 dial exchanges of the "All-Relay" type in towns and in private institutions. These equipments are found in many of the largest universities, such as Harvard and Duke, in banks, such as the Cleveland Trust company, in insurance companies, such as Central Union Life of Cincinnati, in hospitals, such as the Ford hospital at Detroit, in industrial plants, such as those of the Carnegie Steel, The American Steel & Wire, Union Carbide, and the Standard Oil companies.

### Recent Installations

One of the latest dial controlled "All-Relay" equipments was sold a few months ago to the Associated Telephone Utilities, and is operating at Harbor Beach, Mich. Another late example of a dial controlled "All-Relay" exchange has been put into operation recently in Minnesota, for the Pioneer Telephone company, replacing the magneto switchboard in a grounded line system having a considerable number of long grounded party lines with many stations, with no rehabiliation of the plant beyond clearing up a few high resistance joints and bad linegrounds. TELEPHONE ENGINEER hopes to be able to present in the near future a description of this very interesting system, which is on the lines of the equipment exhibited by the North company at the last telephone convention.

# Telephone Activities in Foreign Countries

**Dispatches from Abroad Keep Telephone Men in United States Constantly Informed Concerning Telephony of the World; Domestic Telephone Problems Oftentimes Can Be at Least Partially Solved by Watching the Outcome of Experiments Made Elsewhere**

### Automatic Telephone Installation to Be Made in Honduras

The Government has placed an order for complete telephone plant for state use of the latest rotary automatic type. The switching equipment will have an ultimate capacity of 4,000 lines and an immediate capacity of 1,000 lines. Both ærial and underground cables will be used, and the installation is expected to be completed early in the new year.

### Telephone System of Danzig, Poland

On December 31, 1930, there were 11,520 principal telephone connections in the Free City of Danzig, making a total of 19,881. In the municipalities of Danzig and Zoppot automatic equipment is in use, while in the rural districts, which have 140,000 of the Free City's total population of 407,000, common battery manual equipment is still employed. The Post and Telegraph administration, which operates the service, plans to replace this with automatic equipment, but for the current fiscal year at least the necessary funds will not be appropriated. Gross receipts from telephone operations in 1930 amounted to approximately $1,200,000. In the calendar year 1929 the Danzig telephone service had 20,152,000 local calls and 1,130,000 toll calls, including both domestic and foreign.

### Swiss Telegraph and Telephone Returns

The Swiss telegraph and telephone receipts for the first six months of 1931 were 42,710,741 Swiss francs, compared to 39,378,098 Swiss francs for the first six months of 1930. (One Swiss franc equals about $0.193.) The expenditures for the same periods were 22,353,250 and 20,963,674 Swiss francs, respectively. The number of telegrams handled for the first six months of 1931 were 2,480,686 as compared to 2,738,847 for the same period 1930. The number of telephone calls for the same periods were 121,904,547 and 110,948,688, respectively.

### L. M. Ericsson Mexican Telephone Company Shows Profits

The annual report of the Mexican Telephone Company Ericsson, a subsidiary of the Swedish L. M. Ericsson Telephone company, shows expansion and increased profits during the past year according to information received from the office of the American Commercial Attache in Stockholm. The gross profit amounted to 2.69 million kronor (one Swedish crown equals $0.268) and after transferring 1.33 million kronor to the amortization fund of the telephone nets the remaining net profit amounts to 1.36 million kronor against 1.28 million kronor the previous year.

The board proposes to pay a dividend of 8 per cent per share and 7.20 kronor, per share of the 1930 emission and to transfer 0.3 million kronor to the profit and loss account. The total assets and liabilities balance at a sum of 57.7 million kronor. At the end of the past year the number of telephones of the company's net was 45,806, an increase during the year of 5.087. Considerable expansion of the telephone net has been made in Guadalajara and Puebla as well as in the important cities of San Luis Potosi and Morelia.

### Portuguese Government Telephone Service

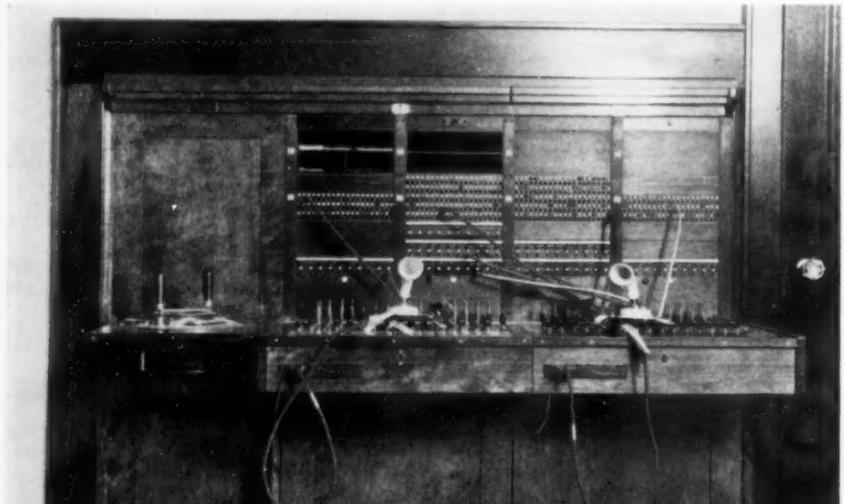
The number of subscribers to the Portuguese Government telephone service on June 30, 1931, was 7,827, compared to 7,664 subscribers on December 31, 1930. The number of local exchanges for the same periods was 50 and 38, respectively, while the number of public telephones on June 30 was 197 as compared with 139 at the end of December last.

# Tonganoxie Switches to Common Battery

## Subscribers of Kansas Exchange Approve Change from Magneto to Common Battery System Almost One Hundred Per Cent; Telephone Company Installs Kellogg Switchboard

By W. C. STREHL,
Representative Kellogg Switchboard and Supply Company

Tonganoxie, named for an Indian chief, is in the approximate center of the Delaware Indian Tribe reservation, in eastern Kansas. It was established in 1866 on the old trail that was traveled by the early settlers going west. This old trail is now known as U. S. Highway No. 40. The town has a population of 1,108 and is located in the center of a rich agricultural section, producing chiefly milk and dairy products, poultry, eggs, corn and alfalfa. The milk and dairy products in the vicinity of Tonganoxie support a milk condensery which handles over 125,000 pounds of milk daily.



*The new six-hundred line Kellogg two-position local and toll switchboard*

The Suburban Telephone company of Tonganoxie was organized in 1901 with thirty magneto telephones operating on grounded lines inside the city limits. Their first switchboard was a one hundred-line magneto type board with no rural lines or toll connections.

Subscribers increased so rapidly that it was necessary to replace the central office equipment of the company three times since 1901, to provide the required increased capacity. The present board is a new Kellogg two-position Universal switchboard in a low-type cabinet, having 260 local lines installed, 50 lamp signal rural lines and 10 lamp ended toll lines. A solid mahogany switchboard cabinet was chosen to harmonize with the office interior and furnishings.

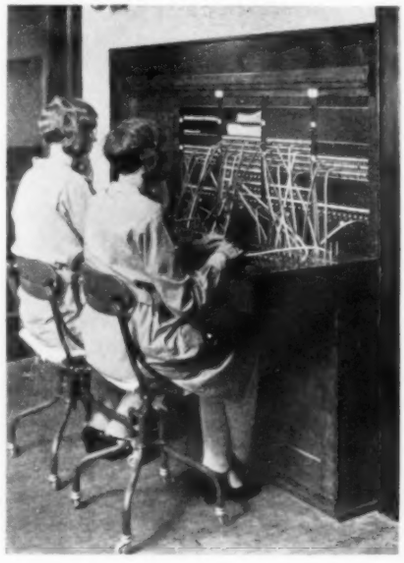
At present the company has 593 subscribers, 303 of whom reside within the city limits, and 290 of whom are rural subscribers. There are eight toll lines which give Tonganoxie subscribers direct connection with Kansas City, Mo., Lawrence, Topeka and Leavenworth, Kans. This means toll service to the entire United States, and foreign countries where radio-telephony service is established is available.

Up to the time of the cut-over to the new Kellogg board, the Suburban Telephone company operated the Tonganoxie exchange entirely as a magneto plant. In the early part of 1930, Foster Laming, president and general manager of the company, realized Tonganoxie's need for modern, faster telephone service. With this in mind, Mr. Laming laid out a campaign to advise the subscribers of the numerous advantages of a common battery system over the old style magneto service.

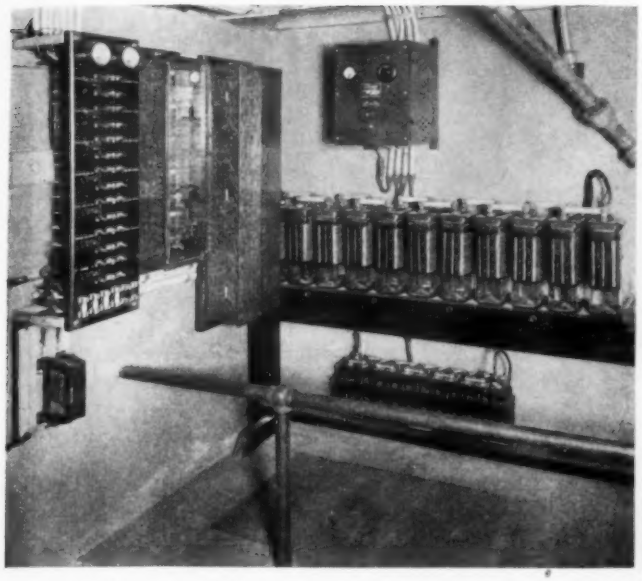
A petition was then circulated among the subscribers which included a complete record of facts and figures embodying the exact difference in cost and the many superior features of the newly proposed common battery system over the old magneto. In this petition the telephone company proposed to install the most modern common battery telephone plant, furnishing all subscribers within the city limits of Tonganoxie common battery service at an increase in the monthly rental.

Nearly 100 per cent of the subscribers signed this petition without objection—a showing that any company would be proud of. This percentage is an indication of the friendly relations that exist between the company and its subscribers and the high degree of confidence that the people repose in it. As Mr. Laming said, "It is a result of our many years of work in striving to render our subscribers the best service possible, and in creating good-will whenever the opportunity existed, even if we had to go out of our way to do it."

When the petitions were returned, work was started immediately so that the new service would be in operation as quickly as possible. Thirteen thousand, six hundred and fifty-six feet of cable and 50,000 feet of lead-in wire were installed. Underground cable eliminated much overhead wiring and many poles throughout the town. New telephone instruments were installed before the old ones were re-



*The new Kellogg board readily handles the Suburban Telephone Company's heavy traffic load*



*Power equipment showing compact arrangement of batteries and charger with Kellogg power board and harmonic ringing equipment.*

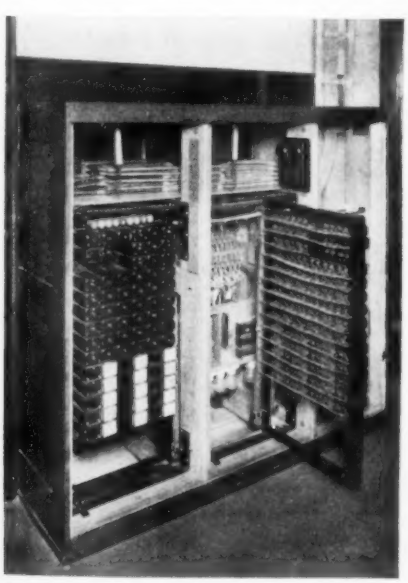
*Operating force of The Suburban Telephone Company*

moved. Consequently service was not interrupted during the cut-over.

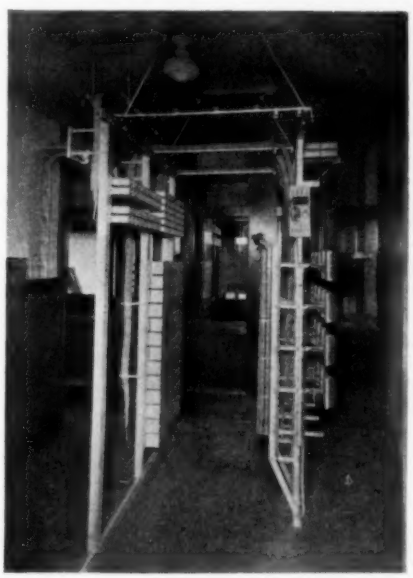
A new two-position Universal Multiple switchboard and all the new line supplies and equipment for outside work were purchased from the Kellogg Switchboard and Supply company of Chicago. The board is arranged for an ultimate capacity of 600 lines. At present it is wired for 260 Universal local lines, 10 magneto toll lines and 50 magneto rural lines.

In addition to operating Tonganoxie, this company owns and operates a magneto exchange at Bashor, Kans., with 225 stations. The territory around Bashor is exclusively agricultural.

Toll traffic on the Tonganoxie board is exceptionally heavy, due to the location of the city in relation to Kansas City, Mo., Topeka, Lawrence, and Leavenworth, Kans. The University of Kansas, located at Lawrence, adds considerable traffic.



*Rear view of new Kellogg solid mahogany switchboard recently installed.*



*Apparatus room showing neat construction of Kellogg relay rack and Cook M. D. F.*

The traffic department at Tonganoxie consists of the chief operator and five switchboard operators. Miss Charlotte Kramer, the chief operator and bookkeeper, has been with the Suburban Telephone company since 1921

---

The western district of the Michigan Associated Telephone company, which includes the territory from Muskegon to Ludington, will receive $48,000 in 1932 to spend for cable extension, rural and pole lines.

## MECHANICAL DEVICE ANSWERS TELEPHONE FOR ABSENT SUBSCRIBERS

The High Point telephone directory published by the North State Telephone company of High Point, N. C., appeared recently as the first directory in the United States to carry listing of numbers for a mechanical device to answer the telephone in the absence of the subscriber.

This device was invented and designed by the Tilden brothers of High Point, and probably will be put into general use.

---

## GERMANY'S OPERATORS ACCEPT AND DELIVER MESSAGES

No longer will "No answer" reduce the user of a Berlin telephone to bad language. He can call up a new department —the "Customers' Service"—and ask: "Has Barbarossa 71-96 left word, when it will answer again?" Suppose he is told, no; "All right," says he, "you keep after it, please. Get hold of Mr. Schmidt—or tell his wife if he isn't there —that Mr. Becker is very anxious to have Mr. Schmidt come with him to the American Chamber of Commerce luncheon, at 1:30, and to phone me at my office if he can't come. Yes, he'll know the number. Becker, Christian B-e-c-k-e-r. Thanks."

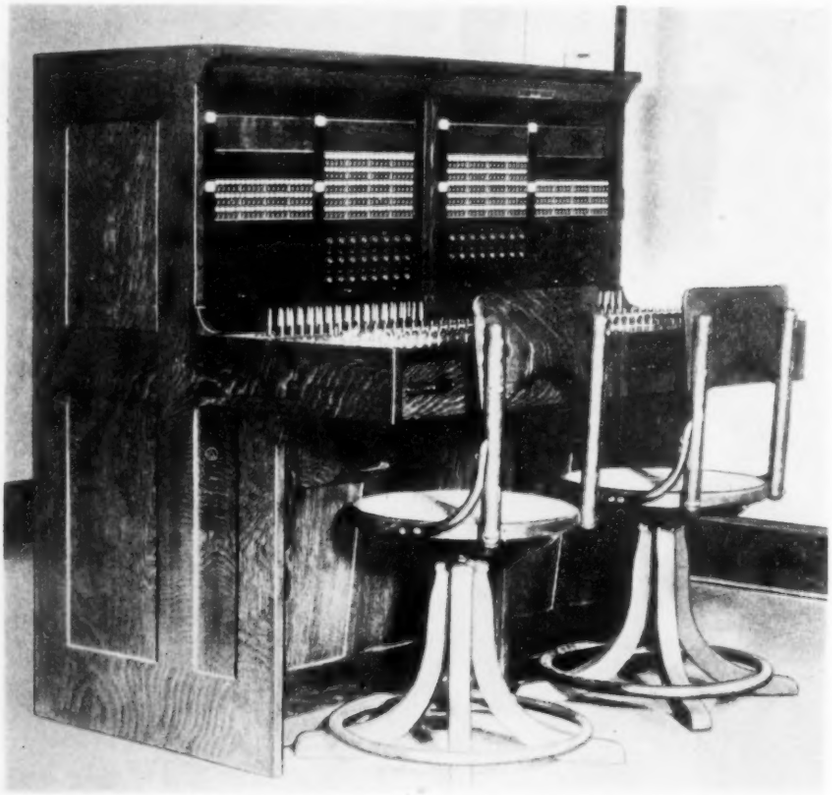
The customers' service operates daily from 7 a. m. to 10 p. m. and its facilities are at the disposal not only of subscribers but users of any public telephone. A similar service has also been installed in Hamburg, Cologne, and Wiesbaden and its maintenance, and subsequent extension to other cities, will depend on what use the public make of the new feature. The German telephone system is State-owned and operated under the Postoffice.

# Cambridge City Has Efficient System

## Three-Position Stromberg-Carlson Junior Multiple Switchboard Installed by Eastern Indiana Telephone Company to Take Care of Unusually Rapid Growth of City

By Paul D. Myers, Sales Representative
Stromberg-Carlson Telephone Manufacturing Company

The telephone has played a great part in the development of many cities and communities—but there is one community in Indiana in which it has been a potent factor in its development—that of Cambridge City. This town has the distinction of being the only Cambridge City in the world. It is located in Wayne county and was one of the first settlements in Indiana. The town is located on the original National road from Baltimore to St. Louis, which was built by the Federal Government. Before the day of the railroad it was located on a canal known as the White Water tributary, running from Cincinnati to Cambridge City.



*Stromberg-Carlson Junior Multiple switchboard in the Cambridge City, Ind., exchange*

The town has grown rapidly and today it has a population of 2,060 and is a thriving trading center, drawing trade from the community surrounding it. Free telephone service is given between Cambridge City and Milton, 2 miles south; Dublin, 2 miles west and Pershing, 2 miles east.

Today Cambridge City is the center of the casket manufacturing industry, there being three large casket factories there. It is also the home of Bertsch & company, manufacturers of metal shears and punches and the Mal-Gra Castings company, manufacturers of malleable iron casting.

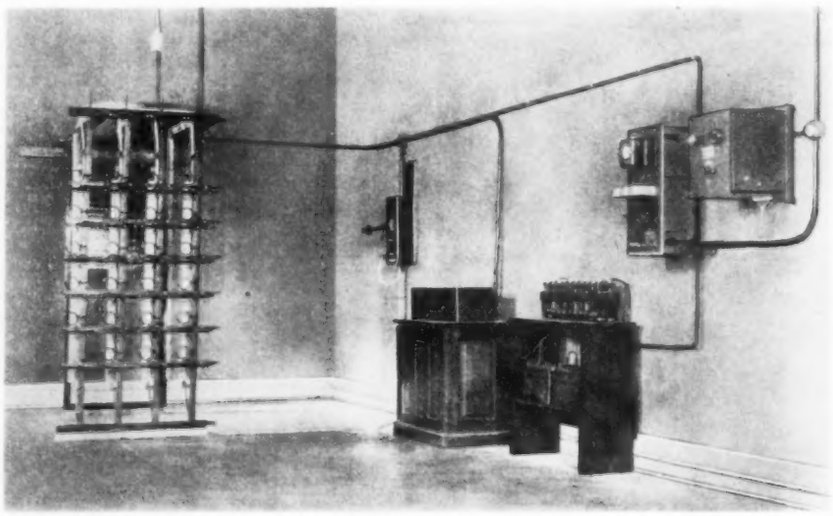
Cambridge City also is known the country over among horse racing enthusiasts for it is the home of John Lackey, who has a national reputation as a breeder of fine race horses and riding horses.

The Eastern Indiana Telephone company, founded in 1895 and owner of the telephone exchange at Cambridge City has played an important part in the recent life of Cambridge City. When that company purchased the Cambridge City exchange, the community was in great need of improved telephone service, due to its unusually rapid growth during the few preceding years.

The company realized this need and in 1928 installed a Stromberg-Carlson Junior Multiple switchboard, giving Cambridge City one of the best telephone systems for any town its size. Subscribers have continually praised Byron Stratton, manager of the Cambridge City exchange and the Eastern Indiana Telephone company for the up-to-date telephone service, which they have given them the past two years.

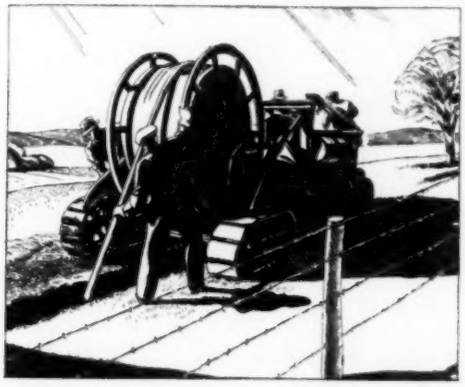
The system at Cambridge City is one of the best in the state. It consists of a three position Stromberg-Carlson Junior Multiple switchboard, including two local positions and one toll position, and complete terminal, power, machine and wire chief's testing equipment.

The positions of the switchboard consist of high efficiency universal cord cir-



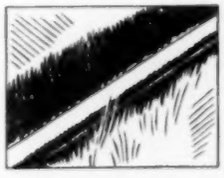
*View in the Cambridge City, Ind., exchange, showing main distributing frame and power equipment.*

A CABLE WITH **SEVEN** PROTECTIVE COVERINGS



# It defies corrosion!

## *You bury this* Tape Armored Cable *directly in the ground!*



Strength to resist soil corrosion is built into every foot of Western Electric Tape Armored Cable.

Think how this simplifies the work of laying. Cable can be paid out from the reel directly into the ground. Time and labor are among the savings.

Seven coats of armor protect the conductors. First the lead sheath is flooded with an asphalt compound held on the sheath by a layer of impregnated paper tape. Then comes two layers of jute roving, followed by two layers of steel tape. Over these, two wrappings of jute yarn are applied. As added protection, each wrapping is thoroughly covered with asphalt compound. As the final process, the cable passes through a whiting bath.

Write for more detailed information regarding the many uses to which Western Electric Tape Armored Cable may be put.

# *Western Electric*

LEAD COVERED CABLE AND TELEPHONE APPARATUS

*Distributed by*
**GRAYBAR ELECTRIC CO.**

GRAYBAR BUILDING, NEW YORK, N. Y., *Offices in 76 Principal Cities*

Identify your inquiry to advertisers by saying—"As shown in TELEPHONE ENGINEER"

cuits and provide for the following features:

1. Bridged manual listening which permits the operator to listen in on either the answering or calling cord separately or when both cords are up on circuit.

2. Four party ringing or calling cord and also code ringing in either cord or Harmonic ringing on answering cord in connection with four party master key.

3. Audible busy test which guards against connections with busy lines.

4. Repeating coils in each circuit to insure maximum talking efficiency with minimum noise from inductive disturbances.

5. First two cord circuits in each position are equipped with highly efficient repeating coil of ring through, talk through type, controlled by key to provide for ideal talking conditions for long distance service.

6. Balance of cord circuits in each position are equipped with repeating coils of non-ring through type eliminating confusion as subscribers "ring-off" does not pass through the cord circuit to the connected line.

7. Double supervisory signals increase the efficiency of operating by designating to the operator which party on a connection has hung up or rung off.

8. Automatic adaptation to the line in which the plug is inserted precludes any necessity of particular cord selection. The connection may be made between any class of service such as central energy and central energy, magneto and magneto, or magneto and central energy lines.

9. Generator cut off on calling cord which prevents subscribers from being rung in the ear after the receiver has been removed from the hook switch and the supervisory relay in cord circuit has operated.

The operator's telephone circuit provides the following features:

1. Anti-side tone qualities are provided wherein outgoing transmission, including the effect of local noises, is prevented from reaching the operator's receiver and interfering with good receiving.

2. Common monitoring key allows the operator to listen in on a connection with practically zero loss to the talking circuit.

3. Duplicate cut in jack. Duplicate jacks are provided so that the operator is enabled to listen in on a position while learning. The jack can also be used by the chief operator or monitor for cutting in on a position.

4. Circuit cut out is effected when the operator removes her head set from the jack. This act opens both the primary and secondary circuits so that when one position is switched to another there will be no losses by bridging circuits.

By the manipulation of a push button key, any two or more positions may be connected so that cord circuits of one position are available to the operator of an adjacent position. This arrangement is, at times, convenient for night service or when one operator alone is working at this switchboard.

## STANDARD FOR MANHOLE FRAMES AND COVERS

A proposal for an American standard for manhole frames and covers containing recommendations for thirteen types of frames and seven types of covers to replace the thousands of types now in use has just been published by the American Standards association. The demand for innumerable different designs and sizes of openings for manholes by the various public utilities and municipal supply departments which make use of manholes for their underground pipes and lines has caused many difficulties in manufacture and replacement of manhole frames and covers. The present concerted effort to standardize on a few sizes and styles is the result of these difficulties. Since 1924 a technical committee has been working on the subject under the procedure of the American Standards association, going through a long process of elimination, selection and re-design.

Following are the types of manhole frames for which standards are proposed:

Straight type round base.

Flared type round base.

Flared type square base (height 10 inches).

Flared type round base, shallow.

Flared type square base, shallow.

Flared type square base (height 7 inches).

Flared type square base, light weight.

Straight type square base.

Straight type round base, for inner cover.

Straight type square base, for inner cover.

Straight type round base, shallow, flange midway between top and bottom, for inner cover.

Straight type square base, shallow, flange midway between top and bottom for inner cover.

Shallow ring.

## UNIVERSITY TEST OF FWD TRUCK PROVES IT 88.2 PER CENT EFFICIENT

Announcement has just been made of an exhaustive test of an FWD four-wheel-drive truck conducted at Purdue University, Lafayette, Ind. The overall efficiency of the FWD, and the efficiency of the various units, such as axles and transmission, were thoroughly tested. It was found that 11.8 per cent of the power developed by the motor was required to operate the truck, and 88.2 per cent went into use for work, that is to say, it was used in moving or hauling heavy loads, or in negotiating bad roads. In other words, the FWD truck is 88.2 per cent efficient.

This exhaustive test is permanently recorded in a thesis at Purdue, which was written by Lieutenants M. W. Daniel and M. K. Kurtz of the Field Artillery, U. S. A. The lieutenants conducted the test and wrote the thesis while acquiring their Master of Science degrees at Purdue University during the year 1930-31. They went to the FWD factory at Clintonville, Wisc., and drove an FWD back to the university in order to scientifically test its efficiency. One of the standard truck models, taken from the regular line of production, was selected for this test. During the test the university authorities had complete charge of the truck and were at liberty to conduct the test as they saw fit.

After the truck was driven to Purdue University, a distance of 364 miles, it was operated on various road tests for a period of 5 months, with the following results:

(a) Running at a speed of approximately 28 miles (47 kilometers) per hour, the brakes were applied and the truck was brought to a complete stop within the truck's own length.

(b) The average mileage per gallon of gasoline was 5.5 (2.3 kilometers per liter).

(c) The truck climbed grades of 78 per cent. The truck could have climbed steeper grades had not the flow of gasoline been cut off because of the angle at which the carbureter was tipped.

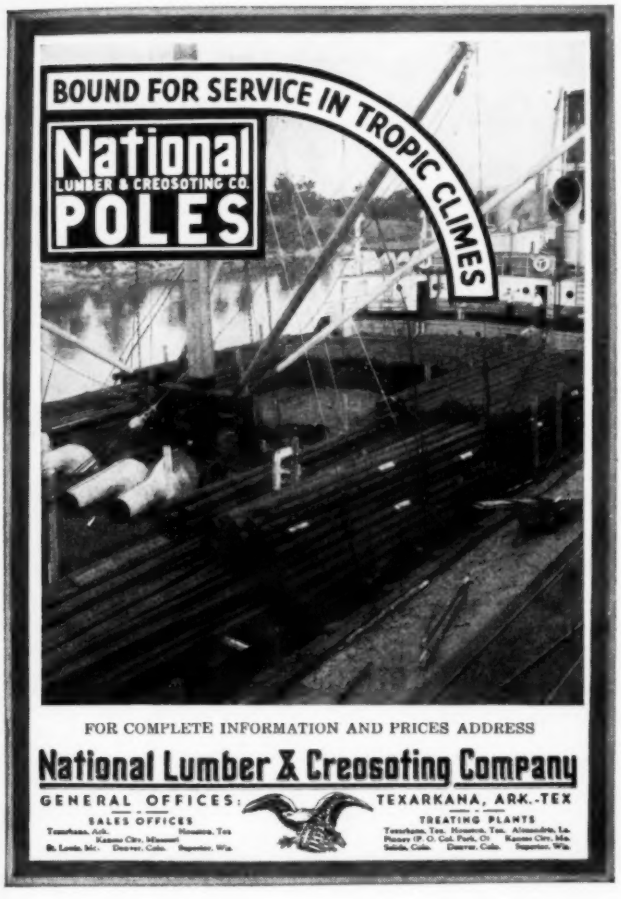
The laboratory efficiency test was then conducted, in which it was found that the FWD was 88.2 per cent efficient. The equipment which was used was considered to be the finest and most accurate ever constructed for such work. This test was extremely accurate, with the assurance that at any time it could be rerun with the same results.

## DIVIDE WORK AMONG EMPLOYES

Western Electric sales in 1931 will be approximately $229,000,000, which compares with $361,478,000 in 1930. During 1931 the company has operated upon the policy of spreading the available work among as many employees as possible, and the entire force is now working on shortened hours, with a maximum of five days per week. At the close of the year there will be about 44,000 employees on the payroll.

## CHOOSE OFFICERS

At the annual business meeting of the stockholders and directors of the Port Arthur Telephone company, Port Arthur, Texas, held in Dallas, Tex., in December, the following officers were elected for 1932: P. Kerr Higgins, president; C. A. Gates, vice-president; H. D. McBride, secretary; W. R. Faught, assistant secretary, and R. A. Nickerson, treasurer.



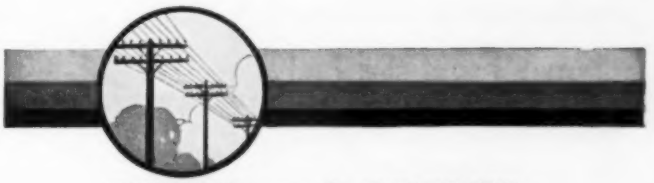

FOR COMPLETE INFORMATION AND PRICES ADDRESS

**National Lumber & Creosoting Company**

GENERAL OFFICES: TEXARKANA, ARK.-TEX

SALES OFFICES

TREATING PLANTS



**WIRES and CABLES**

FOR any type of wire or cable used in Telephone, Telegraph or Power work—get in touch with "Phillips".

This company can supply you with any size, any grade or any type of wire or cable, either bare or insulated to suit your requirements.

Besides this you have the cooperation of a staff of experts in wire and cable manufacture, trained to value quality above all else—backed by a firm which has been in this one business for over forty years. Write for prices.

We are manufacturers of—
Bare and Insulated Copper Wires—Rubber Insulated Wires—Enameled Wire—Magnet Wire—Power Cables—Switchboard Cables—Paper Insulated Cables—Flexible Cords—Electrolytic Copper Rods, Shapes, etc.

**EUGENE F. PHILLIPS ELECTRICAL WORKS, LTD.**

ESTABLISHED 1889

MONTREAL, CANADA

FACTORIES—MONTREAL AND BROCKVILLE
BRANCHES—WINNIPEG, TORONTO REGINA AND VANCOUVER

**TELERING**

**The SUPER-RINGING MACHINE**

Trial Orders Invited

Don't let this year pass without experiencing the satisfaction which results from using TELERING.

DO IT NOW!

Negligible Operating Expense

No Radio Interference

ONLY ONE CONTACT!

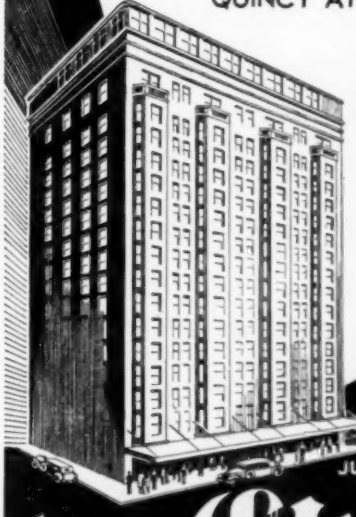
Operated by Commercial Alternating Current

PRICE $44.00—F.O.B. ELYRIA
It Pays for Itself

Sold by Leading Telephone Distributors

**TELKOR, INC. » Elyria, Ohio**

STOP IN THE LOOP
HOTEL
**Majestic**
QUINCY AT STATE STREET



Accommodations of exceptional value

ROOMS WITH PRIVATE BATH FROM $2.

*Beautiful meeting room for 300 people*

NEW GARAGE NEXT DOOR

HARRY F. HERMANSEN
*Manager*

JUST AROUND THE CORNER FROM EVERYTHING
*in... Chicago*

## News From the Field

Pacific Telephone and Telegraph company will earn approximately $7.75 per share on its common stock in 1931, according to preliminary figures issued by President H. D. Pillsbury. In 1930 profits were equivalent to $8.06 per share.

Telephone subscribers in Rockville, Md., are voting in favor of a rate increase which enables them to have a modern telephone exchange in place of the magneto system which has been in use there for many years. The suggestion of a new exchange was first proposed by the Rockville Chamber of Commerce.

A $25,500,000 construction program for 1932 has been announced by the Bell Telephone company of Pennsylvania through its president, Leonard H. Kinard. This will bring the total outlay for improvements for the three-year period ending next year to $95,000,000.

Northwestern Bell Telephone company will spend about $4,100,000 in Iowa during 1932 for telephone improvements, replacements and extensions, according to C. E. Demorest, district manager.

A telephone line to Brookston, Ind., from Monticello, Ind., has recently been completed, giving patrons of the telephone company a direct communication to Brookston and a better service to LaFayette, Ind.

Approximately 69,000 feet of cable, made up of 700 insulated wires, is being strung between Arpin and Stevens Point by employes of the Wisconsin Telephone company.

Expenditures of $10,513,265 for new construction were authorized in December by directors of the New York Telephone company. This brought total appropriations during 1931 to $69,116,545.

North Bass Island in Lake Erie may soon have telephonic communication with the outside world. Island residents have started raising a fund to pay the costs of laying under-water cable and installation of telephone equipment.

The Diamond State Telephone company will spend $800,000 for new construction and betterments throughout Delaware in 1932, it was announced recently. This is about $200,000 more than that spent for the same purpose last year.

The Wisconsin Telephone company will spend $7,000,000 in 1932 on extensions, replacements and improvements.

"UNIQUE"

THE BETTER TORCH
FOR USE
IN COLD WINDY WEATHER

Starts in 3 minutes.
Powerful flame—2000° F.
Fitted with Orifice cleaner.
Tank of 18 gauge steel.
Cool valve wheel—always.
Easily cleaned and serviced.

Try one for 30 days

UNIQUE MFG. CO., INC.
221 Whiting St. Chicago, Ill.

The Kansas City board of zoning adjustment has granted the Southwestern Bell Telephone company's application for permission to erect a two-story addition to its present building, which is expected to cost approximately $200,000.

Plans have been completed and contracts will be awarded in the near future on the two-story exchange building to be erected by the Illinois Bell Telephone company at Winnetka, Ill. The total investment, including the land, building, equipment and outside plant extensions, has been estimated at $580,000.

Radio telephone service between the United States and Bermuda was opened December 21. It is available to all Bell system and Bell connecting telephones in the United States, Canada, Cuba and Mexico.

Construction of a network of private telephone lines connecting practically every part of the 11th district of the forest fire protection branch of the Wisconsin conservation commission and the erection of four watch towers in the district is rapidly nearing completion, according to F. G. Wilson, area fire warden, who is working in supervision of the construction activities in the interest of increased fire prevention.

The directors of the International Telephone and Telegraph corporation declared recently a quarterly dividend of 15 cents a share on the no par capital stock, payable on January 15 to stockholders of record of December 18, compared with 25 cents a share paid in the previous quarter, prior to which time the stock was on a $2 annual dividend basis.

Bancroft Gherardi, vice-president of the American Telephone and Telegraph company, was re-elected president of the American Standards association for the year 1932 at the annual meeting of the association held in New York December 9.

Lenz Electric Manufacturing Co.
ESTABLISHED 1904 Formerly Runzel-Lenz Electric Mfg. Co. CHICAGO
Specializing in Manufacture of
CORDS
FOR ALL CLASSES OF TELEPHONE WORK
SIERRE EQUIPMENT CORPORATION
Los Angeles—San Francisco—Seattle—Pacific Coast Distributors

# SPECIALISTS

In building Chic Sale Houses?

No!

But in the manufacture of

SUPERIOR GRADE

# CROSSARMS

From Properly Seasoned
Douglas Fir . . . YES!

Descriptive Price Lists Mailed on Request

International Crossarm Company, Inc.
BELLINGHAM, WASH.



## A True Gauge of Toll Traffic

THE Calculagraph is not only a vigilant guardian of toll board revenue, but also an accurate gauge of traffic. The toll tickets recorded by the Calculagraph provide a clerical measurement of toll income down to the last cent, and every penny is always accounted for. Managers also find these records a daily index of their traffic flow—convenient, certain, easy to check up in the brevity of the useful information summed up.

The Calculagraph stamps on the toll ticket the beginning of each call together with the time elapsing during each call, down to the quarter of a minute, for any number of calls—producing a permanent and accurate record of each.

Prices and Information on Request.

THE CALCULAGRAPH COMPANY
50 Church Street Dept. 22 New York City

CALCULAGRAPH
THE ELAPSED TIME RECORDER

**Lineman's Improved Connectors**
*Vacuum Grip-Built*

**Lineman's Special Bolt Cutter**
*Vacuum Grip-Built*

# Against a powerful enemy use only trusty weapons!

BLIZZARDS!—poles bent!—lines down! That's when the lineman needs *the best tools*—trusty weapons to wield against that powerful and ruthless enemy, *Winter.*

These two skilfully designed tools—valuable under normal conditions—will be found doubly so during the cold months, when the handicaps and hardships encountered by the lineman call for easy-to-use tools that assure swift and positive action.

LINEMAN'S SPECIAL BOLT CUTTER

A light weight cutter that is only 14" long, easily carried in the belt. Cuts any wire or bolt up to 5/16"—a capacity equal to that of any 18" cutter on the market.

The only cutter with knives of high carbon Molybdenum alloy electric furnace tool steel, hardened and tempered THRU and THRU. The toughest of the tough! Also the ONLY CUTTER with hammer-forged ALLOY TOOL STEEL HANDLES instead of easily broken malleable cast steel.

Has no adjustment nuts. Cutters, assembled as one unit, can be changed in a few seconds by means of two set screws.

No. 114 (popular size)—Length 14". Cutting capacity 5/16". No. 118—18". Cutting capacity ⅜". No. 124—24". Cutting capacity ½".

LINEMAN'S IMPROVED WIRE AND SLEEVE CONNECTORS

A tool that demonstrates Vacuum Grip superiority, both in design and quality. Jaws automatically kept in true alignment by matched pin and hole, an exclusive feature. Locks TIGHT on sleeve or wire, making it easy for the lineman to twist a perfect joint with little or no effort.

Hammer-forged from electric furnace alloy tool steel, hardened and oil tempered thru and thru. Handles specially spring tempered. Takes care of all popular sizes of copper sleeves and bare wire, including B & S Copper Sleeves Nos. 4-6-8-10 and Bare Wire Nos. 2-4-6-8. Has oval hole for guy strand .437x.624.

PURCHASING AGENTS: Write without delay for prices and full particulars, or, better, let us send you samples of these tools, with the understanding that the purchasing price will be refunded after 30 days if they do not give 100% satisfactory service.

FORGED STEEL PRODUCTS CO., Newport, Pa.
*Manufacturers of the Famous*

**Vacuum Grip** REG. U.S. PAT. OFF. **Pliers**

Built *UP* to a Standard—Not *DOWN* to a Price

NEARLY A MILLION IN USE

# Change "Depression" to "Press On"

A unique and interesting Christmas and New Year greeting was that received by friends of Harold E. Bradley of Harrisburg, Pa. Mr. Bradley is president of the Pennsylvania State Telephone and Traffic association, a former president of the Independent Telephone Pioneers' association, and is well known within the telephone industry.

Mr. Bradley writes concerning Old Man Depression, that if we knock out his "i" and cut off his head, he will say "Press on."

The following is a facsimile of Mr. Bradley's message:

1931 - Greetings - 1932

There's a lesson in everything if we just look for it— Take Old Man Depression himself— knock out his i and cut off his head and what does he say — Let's try it—

PRESSXON — There's the answer— 1931 is about gone so let's forget it— have a Merry Christmas and then "press on" into 1932 with a firm determination to make it a Happy, Prosperous Year—

Yours, with every good wish

Hal Bradley

## INTERNATIONAL TELEPHONE DROPS OPTION

The option held by the International Telephone and Telegraph corporation permitting it to acquire a controlling interest in the Constantinople Telephone company of Turkey has expired and will not be renewed immediately, if at all, it was learned recently. The option was obtained early in 1930 but it never was exercised.

Officials of International Telephone have not commented on the matter but it was understood that an "understanding" exists between the American and Turkish interests and that negotiations may be renewed.

Automatic telephone service, manufactured and installed by an International Telephone unit, was placed in operation in Istanbul early this month. The new exchange is located in Stamboul, the principal business section of the city. Initial installation called for 4,800 lines. The Turkish company serves a population of 680,000 in metropolitan Istanbul and nearby cities. The company operates under an exclusive concession granted by the government in 1911 for a period of more than thirty years.

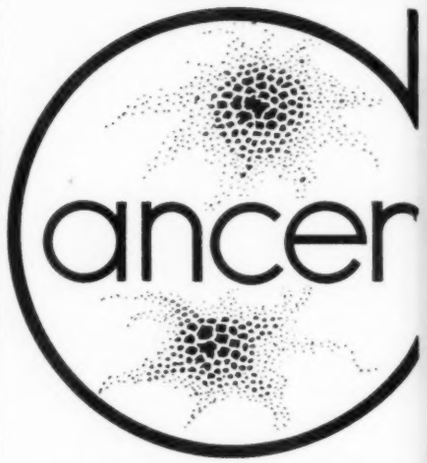
## BATES NEW SALES HEAD OF SQUARE D CO.

C. Lewis Hull, sales manager, switch and panel division of the Square D company, announces the appointment of C. W. Bates, formerly Chicago branch manager of the company, as assistant sales manager.

G. S. Blomgren of the Chicago office succeeds Mr. Bates as Chicago branch manager.

Mr. Bates' headquarters will be at the Detroit factory of the Square D company.

The Southeast Missouri Telephone company recently completed the installation of 1,200 feet of cable at Stanberry, Mo.


EVERY dry cell with soldered joints is subject to crystallization of the active zinc surface—dry cell Cancer.

Storm King Duro Powr Telephone Batteries are entirely immune to dry cell Cancer.

General alone accomplishes this by its seamless one-piece zinc cup of uniform thickness* throughout. Absolutely no chance for crystallization due to soldered joints. Complete assurance of 100% of the original energy after and over a period of *years—not months.*

*Punching or stretching is unknown in the art of drawing. The micrometer will prove it. All zinc, whether soldered or *Drawn* into dry battery cans is *Drawn* during the rolling of the metal from slabs to sheets or strips.

GENERAL DRY BATTERIES
INCORPORATED
CLEVELAND, O.

Makers of all types of dependable Dry Batteries for Radio, Ignition., Flashlight and General Use.

# HUCKINS

450 ROOMS 300 BATHS

RATES FROM $2.

## OKLAHOMA CITY

A Great Hotel in a Great City...Every modern convenience...Special floor for Ladies...Large parlor floor and Ladies' Lounge...New "Dungeon" Dining Room... Also Coffee Shop...Large and small Banquet rooms and beautiful new Ball Room for meetings

JOSEPH HUCKINS JR.
*MANAGING DIRECTOR*

*Other* HUCKINS *Hotels*

KEMP HOTEL WICHITA FALLS, TEXAS

OXFORD HOTEL ENID, OKLA.

WESTBROOK HOTEL FORT WORTH, TEXAS

ICE, SLEET .... miles of line down .... Wire stocks inadequate .... Rush shipments imperative .... Then, look to Jobbers of *Crapo* Galvanized Wire and Strand!

You can depend upon them in every emergency .... and, they in turn, can depend upon us .... for, they know from long experience, that RUSH orders received by us in the morning are shipped before night!

**Indiana Steel & Wire Co.**
**Muncie, Indiana**

**Galvanized Telephone Wire and Steel Strand**

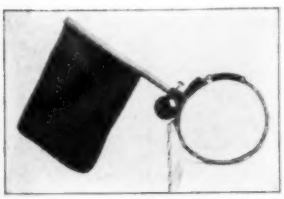
Look for the *Crapo* Tag

# Crapo
GALVANIZED PRODUCTS

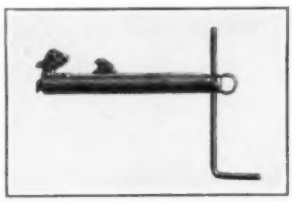
# COFFING HOISTS

"THE UNIVERSAL TOOLS"

are being used by Telephone and Power and Light Companies in construction and maintenance work, changing insulators on tower lines, for pulling guys, messengers, underground cables, laying water and gas mains, or wherever a lift or pull is needed. Can be used in any position. Sizes from ¾ to 6 ton, wt. from 14 to 65 lbs. Model A ¾ ton. Model F 1½ ton.

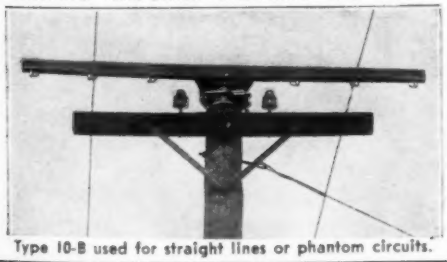


Flag, flag holders, and electric light for poles, pipes, etc., in transit day or night. Can be easily attached or removed. Spring attached to chain so holder will not work loose.



Temporary Guy Clamp. For necking guy wires under heavy tension. 3 bolt clamp can be put in proper location without using hammer.

COFFING TEMPORARY CROSSARM AND CLAMP



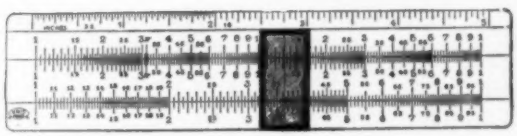
They can be readily clamped to a pole above or between the crossarms. For changing crossarms on corners or on pole lines.

Type 10-B used for straight lines or phantom circuits.

**COFFING HOIST CO.** 313 East Vanburen St. DANVILLE, ILLINOIS

## REACH FOR A 'SLIPSTICK' INSTEAD OF A PENCIL

## A REAL VEST POCKET SLIDE RULE



*White Celluloid* — *5½" Long ⅛" Thick* — *Black Numerals*

**ENGINEERS, ARCHITECTS, ESTIMATORS**

Carry this handy, accurate, easily read slide rule with you—solve your problems in inductance, resistance and capacity—stresses and strains—volume and production costs on the job.

**ANYONE CAN LEARN** in a few minutes. Each rule with a genuine leather case and a Book of Directions.

**$2.50 Postpaid or $2.62 C.O.D.**

**H. S. DURLAND**

**63 Hinsdale Pla. Newark, N. J.**

# Annual Telephone Handbook Published

**Eleventh Edition Edited by T. DeWitt Talmage Is Now Off the Press, and Includes Several New Sections, Such as the American Standard Association's New Dimensions for Wood Poles, a Discussion of Telephone Soldering Methods, and One on the Use of the Lead-Tantalum Rectifier**

The 11th annual edition of the Illinois Telephone Handbook has been thoroughly revised and is now available for general distribution. Each one of the Handbook's 224 pages is filled with helpful information of real value to every telephone man—and especially the man in the smaller telephone organization.

The scope of the Handbook has been broadened this year to include traffic engineering practice and its application to the smaller exchanges. This new section is entitled: Traffic Engineering—a Guide to Economical Operation. In this division of the Handbook will be found, among many other important traffic considerations, a discussion explaining how the use of proper traffic engineering methods may be utilized as a guide in the intelligent selection of switchboard equipment.

Five charts are included in the traffic engineering section. These illustrations aid the reader materially in understanding traffic engineering figures used in computing certain position and operator requirements as well as clarifying the dollars and cents angle of the traffic problem.

The plant engineering, construction and maintenance people will find an extremely interesting section devoted to modern construction standards. The subjects discussed in this division are as follows: Necessity for standardization, underground construction, conduit, poles, pole inspection, treating standing poles, pole sizes, setting poles, crossarms, guying poles, suspension strand, pulling in aerial cable, pulling in underground cable, cable splicing, cable terminals, open wire and installing subscribers' sets.

A special section is devoted to conduit specifications and methods of installing conduit. This detailed information is provided for those who are particularly interested in the economical application of vitrified clay conduit, bituminized fiber conduit and creosoted wood conduit in the well-planned telephone plant.

The pole section has been rearranged and enlarged to include the American Standards association's new dimensions for northern white cedar poles, western red cedar poles, chestnut poles and creosoted southern yellow pine poles.

Another new section has been added this year in the form of an 18-page discussion of telephone soldering methods. This division covers simple soldering instructions for telephone workers and includes many practical hints for improving soldering jobs. This section of the Handbook is based on the soldering bulletin entitled: Successful Telephone Soldering Suggestions, which was issued by the Illinois Telephone association some months ago. However, the number of illustrations has been increased and the text has been considerably expanded in order to make it more complete.

A portion of the new material added to the soldering section is a description of the use of acetylene gas soldering coppers in the outside plant.

The storage battery section has been carefully revised and brought up to date in every respect. Following the storage battery discussion there appears a new division on the use of the lead-tantalum rectifier for telephone service. This material is accompanied by 7 illustrations.

Telephone accountants will be interested in the description of the method of determining the dividing line between depreciation and maintenance. This material is of special interest at this time because on July 28, 1931, the Interstate Commerce commission issued its order in the matter of depreciation charges of telephone companies, docket No. 14,700, effective January 1, 1933.

This section of the Handbook contains a schedule of the major items of plant and equipment designated units of property. According to the commission's report it is intended that retirements and replacements of such units of property will be accounted for through the fixed capital and depreciation reserve accounts and that the retirement and replacement of associated elements and parts of units not constituting complete units as described in the units of property definition will be treated as operating expenses.

The editor-in-chief of the Handbook, T. De Witt Talmage, has contributed an article on the subject of telephone transmission computations. This outline of transmission design work appeared for the first time in the 10th edition, but in the present printing this material has been revised and enlarged to include a discussion of simplified transmission planning of subscribers' loops.

The Handbook is well illustrated by nearly 100 charts, diagrams, sketches, and photographs. A complete cross-index in the rear of the book lists hundreds of interesting items and bits of information which are needed daily by telephone men.

The Handbook is published in convenient pocket size, slightly over five inches in width, so that it may be easily carried in the coat pocket as a ready reference book. Especially attractive is the dark green cover and its harmonizing blue-black ink. The weight of the Handbook has been reduced to only seven ounces in order that the book may not be classed with the usual bulky and cumbersome volumes written on telephone work.

A. J. Parsons, secretary-treasurer of the Illinois Telephone association, Springfield, Ill., states that the supply of Handbooks is limited, and orders for the book will be filled on a basis of "first come, first served."

## CHRISTMAS DAY OVERSEAS CALLS SET RECORD

For the fifth year in succession, Christmas day overseas telephone calls handled through American Telephone and Telegraph company radio stations in the United States set a record for both volume and number of countries reached. There were 342 such messages sent to or received from Europe, Australia, South America and island groups in the Atlantic and Pacific oceans. This compares with 207 messages for Christmas day, 1930.

Of the total, eighty-seven conversations between this country and Honolulu were handled through the new Bell system radio stations at Dixon and Point Reyes, Cal. This speech channel was put into public service in December. Messages to and from Bermuda numbered twenty, while thirteen were exchanged with Rio de Janeiro, Brazil.

Christmas message traffic to Europe made a total of 182 conversations, against 165 on Christmas day last year.

New York City accounted for seventy-nine transatlantic messages, Chicago for eight, Boston seven, Philadelphia five and Washington three.

---

The Commonwealth Telephone company, Madison, Wis., has been authorized by the public service commission to issue $45,200 in capital stock to purchase properties of 17 small telephone companies in northern and central Wisconsin.

---

Service between the Ohio Telephone Service company and the Farmers' Telephone company of Sidney, Ohio, was united at midnight, New Year's eve. This was the beginning of the ultimate consolidation of the two companies into one and was made without any increase in rates.

# MANY
## More Hours of Service

YOU'RE not interested in what's in a battery, nor how it's made—you want *hours of service*. Ray-O-Vac Telephone Batteries give you *many more* hours of service, as proved by tests conducted in accordance with U. S. Government standards, and by records of users. It's this longer life that makes the service-hour cost of Ray-O-Vac Batteries so remarkably low, and decreases service expense. Put Ray-O-Vac Batteries to work, and you'll find that Ray-O-Vac's longer life means real battery economy.

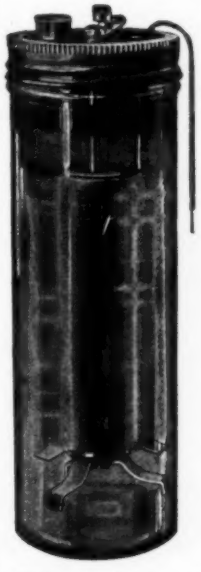
**FRENCH BATTERY COMPANY**
**Madison, Wisconsin**

*General Sales Offices:*
*20 North Wacker Drive, Chicago, Illinois*

Makers also of Flashlight Batteries, Rotomatic and Standard Flashlights and Electric Lanterns

**RAY-O-VAC**

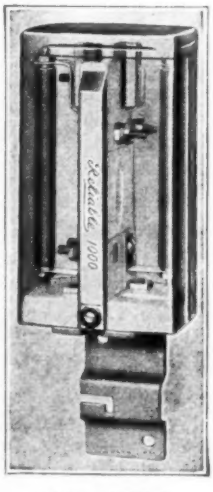
The
# WATERBURY
# TELECELL



*A*
*Modern*
**TELEPHONE CELL**
***FOR LONGER DEPENDABLE SERVICE***

The Waterbury Battery Company
WATERBURY, CONN.

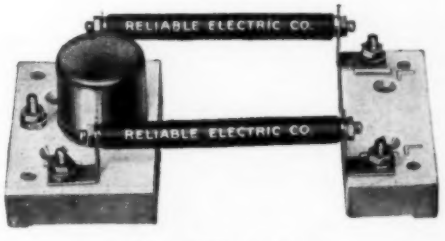
# OUTSIDE or INSIDE




No. 1000

"Reliable" offers high-grade telephone protective equipment to meet the demand of all construction conditions.

For low installation cost, low maintenance and maximum efficiency specify "Reliable."




No. 977 H H

The No. 1000 and No. 977HH Protectors have carbons, discharge blocks, and fuses that are interchangeable.

*Reliable* Electric Company

3145 CARROLL AVE. CHICAGO, ILLINOIS

# With Manufacturers and Jobbers

## WESTERN CONCERN RESTRICTS BUSINESS TO MAKING CROSSARMS

The International Crossarm company, Inc., is incorporated under the laws of the state of Washington. Its manufacturing plant is located at Bellingham, Wash., adjacent to the Bellingham harbor and the tracks of Great Northern and Northern Pacific railways which provide convenient shipping facilities by both water and railroad.

The company has been in business about ten years and restricts its operations to the making of crossarms, in which it is truly a *specialist*.

The International Crossarm company, Inc., is equipped for making all sizes of crossarms, which may be required for any purpose.

The two grades regularly supplied are designated by the names "Superior," which is the equal in quality and workmanship of the product of any factory on the Pacific Coast, and "Utility," which is an article suitable for any ordinary use, made of good, sound, strong Douglas fir.

Many large orders have been filled by this concern for most critical customers to their entire satisfaction.

The owners and managers of the company have been making crossarms out of Douglas fir since 1908 and have learned by long experience exactly how to season and prepare the wood for making long-lived strong crossarms. Inquiries for descriptive grading rules and price lists are invited.

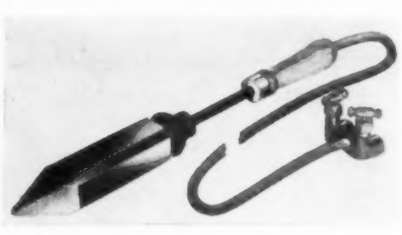
---

## GAS-HEATED SOLDERING IRON IS EFFICIENT

Increased efficiency and greater economy are two of the outstanding advantages of the new "Torchiron" gas-heated soldering iron recently introduced by the Reliance Specialties Manufacturing company, 122 East 42d street, New York.

Using the "Torchiron," the operator has a continuously heated soldering iron for steady work.

Low gas consumption is assured. With



*New "Torchiron" Soldering Iron*

the 3 pound head, the fuel required is only 4 or 5 cubic feet of gas per hour, and with the 5 pound head, 5 or 6 cubic feet of gas per hour.

This iron is heated by either natural or artificial gas and low pressure air mixed by means of a needle valve, and passing through a flexible hose to the handle of the torch, making it very easy to operate.

Constant temperatures are increased or decreased at the option of the operator by regulation of the needle valve. The copper heads may be brought to a red heat within 3 to 5 minutes after lighting. A great deal of the filing and cleaning, dipping and retinning of the coppers is eliminated, inasmuch as the copper heads are not exposed to the open flame.

Coppers are available in sizes ranging from ½ to 5 pounds. They also are made to specifications. The coppers are quickly interchangeable, being screwed onto the stainless steel tip. As the name implies, the "Torchiron" may be used as a torch as well as an iron, merely by removing the copper head.

---

## G. E. INTRODUCES NEW GASKET MATERIAL

A new gasket material, moisture-proof, and highly oil-resistant has been announced for sale by the General Electric company. This material, known as No. 1000 Compound is recommended especially for applications where the primary purpose of the gasket is to exclude moisture, for which purpose it has been found superior to cork or other rubber compounds.

It is a white, odorless, sulphur-free rubber compound, available both in sheets and moulded shapes. It is extremely tough and strong, very flexible, requires no sticker, and can be used repeatedly in testing work, as well as in permanent joints. It is unaffected by exposure to the weather, and when under compression in properly-made joints is not attacked by cold oil. In contact with hot oil it is practically unaffected where enclosed in recessed joints under compression, but is not generally recommended where resistance to hot oil is of prime importance. Mildly alkaline solutions, such as derived from Portland cement, or dilute acid solutions have no apparent effect on this material.

This material has been found especially useful in making joints in porcelain and metal assemblies, such as in dry-type bushings for outdoor transformers and oil circuit breakers. It is used effectively, also, in terminal pot-heads for lead-covered cables. It has been used also for subway transformers, covers of switchgear, factory treating tanks, factory testing of transformer radiators, and sealing of gas-filled machinery.

## BENDIX INTRODUCES FLEXIBLE METALLIC TUBING

A seamless, flexible metallic tubing which is claimed will find an important place in practically every industry, has just been placed on the market by the Bendix Aviation corporation.

The new product can be effectively applied to such widely varied uses as lubrication, gum manufacture, electric wiring conduits, automobile exhaust pipes, radiator hose, shielding airplane radio, hydraulic and airbrake systems and oil burners. It has withstood pressure of 10,000 pounds to the square inch and temperatures of over 500 degrees.

The hose is seamless from the tip of one fitting to the tip of the fitting at the opposite end because the fittings are brazed or welded, forming an integral part of the hose. This construction prevents leaks developing in the hose and breaks occurring beween the hose and its fittings, as frequently happens with interlocked or locked joint metal tubing.

Made of special bronze alloy seamless pipe, the Bendix hose is corrugated in round-thread single lead deep wall form and does not contain welded, brazed or interlocked joints. Engineers claim the Bendix hose is far more flexible than existing types of metal hose because of its "deep wall" construction.

A protective casing, braided from copper is designed to cover the hose with either one, two or three layers, depending on the pressure the hose must withstand. As a protection against mechanical damage to the braid covering and to distribute the flexing action, the manufacturer recommends use of an interlocked, unpacked galvanized steel casing over all.

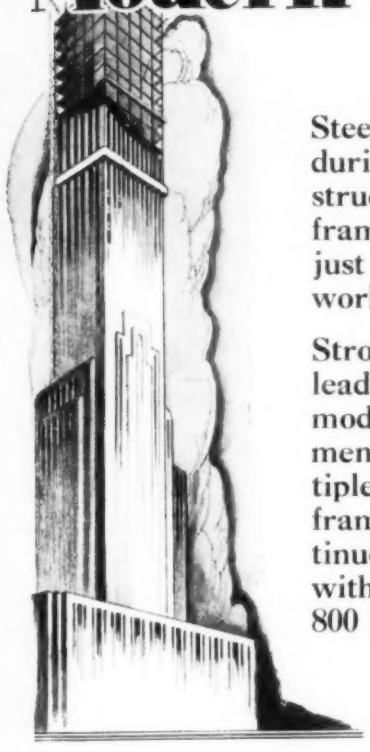
The new product is being made by the Bendix Stromberg Carburetor company, subsidiary of the Bendix Aviation corporation at South Bend, Ind., and orders for 3,000,000 feet for 1932 delivery have been received prior to formal announcement.

The hose is being manufactured at present with internal diameters of 3/16, ¼, ⅜, ½, ¾, and 1 inch, but engineers declare it can be made in practically any size desired.

---

The Wisconsin public service commission has authorized the Lemonweir Valley Telephone company to put into effect for nine months an emergency discount of 25 cents a month to subscribers on rural service party lines. This discount is in addition to the usual discount for prompt payment, making the net rate for rural service $1.25 a month.

# Modern Steel Construction



Steel, strong, rigid and enduring is the modern construction material for the framework of switchboards just as it is for the framework of large buildings.

Stromberg-Carlson, as a leader in the development of modern telephone equipment, builds its Junior Multiple Switchboard in steel frame units that form a continuous face switchboard with an ultimate capacity of 800 lines.

This switchboard is accepted by many companies* operating in small communities, as the ideal equipment for the replacement of magneto or obsolete central energy apparatus. The high quality of service furnished through the Stromberg-Carlson Junior Multiple Switchboard is readily recognized by subscribers. They are willing to pay a rate adequate to satisfactorily compensate the operating company for its investment.

Let Stromberg-Carlson engineers provide you with specifications and other valuable data that will prove to you that the Stromberg-Carlson Junior Multiple Switchboard will furnish modern telephone service to the small community at a profit.

*Location of companies operating Stromberg-Carlson Junior Multiple Switchboards furnished on request.*

*Write for Bulletin 115-116*

*Stromberg-Carlson Junior Multiple Switchboard Installations*

- Furnish modern service at low cost.
- Effect substantial savings in the cost of telephones.
- Reduce expense of dry cells.
- Supply fast and accurate service.
- Permit close supervision.
- Provide uniform transmission.
- Increase operator efficiency.

***"There Is Nothing Finer Than a Stromberg-Carlson"***

**Stromberg-Carlson Telephone Mfg. Co.**

*Pacific Coast Representative*
Garnett, Young & Co.,
San Francisco, Cal.
Los Angeles, Cal.
Portland, Ore.
Seattle, Wash.

*Factory and General Offices:*
100 Carlson Road, Rochester, N. Y., U. S. A.

*Branch Offices:*
CHICAGO, ILLINOIS KANSAS CITY, MO. TORONTO, CANADA

*Southern Representative*
Scoville Mercantile Company,
Atlanta, Ga.

# Stromberg-Carlson

## MILLER REJOINS FOUR WHEEL DRIVE AUTO COMPANY

F. C. Miller has rejoined the Four Wheel Drive Auto company of Clintonville, Wis., as a member of the sales engineering staff. He will work with customers in designing and applying new adaptations of the FWD product. Special attention will be given to the development of FWD trucks in new markets.

Miller has had a variety of engineering experience, having been shop engineer for the Denver & Rio Grande Western railroad, and a former member of the City of Los Angeles engineering staff. His first connection with the Four Wheel Drive Auto company was in 1911 and 1912, at which time the concern was also manufacturing passenger cars. Leaving in 1913 for the west coast, Miller returned to the FWD for a short time in 1929. The Allis Chalmers Manufacturing company claimed his services until recently when he accepted his present position.

## TOLL MERGER ORDERED DISSOLVED

The Indiana Public Service commission has approved an order dissolving the Intercommunications corporation, a company which had held the toll properties of a number of northern Indiana telephone companies for which the United Companies, Inc., is the holding company.

The order directed that the properties be returned to the original companies and their holding company. They are: Central Lakes Telephone corporation, Communications Realty corporation, Interstate Radio corporation, Jay County Telephone corporation, Johnson County Telephone corporation, Kosciusko County Telephone corporation, Miami-Wabash Telephone corporation, Newton and Benton County Telephone corporation, Pulaski County Telephone corporation, St. Joseph County Telephone corporation and the Winona Telephone corporation.

St. Joseph, Mich., reports success with the "business exchange" opened as an additional telephone service last November. By means of this special exchange a doctor, dentist, or business man wishing to leave his place of business, will report to the telephone office where he may be found in case an urgent call for him is put through.

WANTED—Local manager, thoroughly trained in the telephone business, competent to meet public. Must have best reference as to honesty and integrity. Address A. C. S., Telephone Engineer.

**RECONSTRUCTED EQUIPMENT**

| | |
|---|---|
| Kellogg No. 22 4-bar Bdg. generators with Crank & Mounting Screws @ | $ 2.65 |
| Stromberg-Carlson Latest type 4-bar generators with Crank & Screws @ | 2.00 |
| Kellogg or Stromberg 1600 ohm self-contained ringers with gongs @ | 1.50 |
| Kellogg No. 2696 type 4-bar 1000-1600 or 2500 ohm compacts @ | 8.00 |
| Kellogg No. 28 Cast head desk set with W. E. No. 240 external post connection 3-bar 1000-1600 or 2500 ohm signal set @ | 8.00 |
| Stromberg-Carlson No. 11 drops and jacks (fit No. 105 board) per strip of 5 | 7.00 |
| Western Elec. No. 317 3-bar 1000-1600 or 2500 ohm Bdg. compacts @ | 6.60 |
| Western Elec. No. 240 external post connection 3-bar 1000-1600 or 2500 ohm Bdg. hotel sets with W. E. Trans. & No. 122 Rec., @ | 4.75 |
| Kellogg No. 22 Transmitters with backs and Mouthpiece @ | 1.10 |
| Western Elec. No. 323 Transmitters with back & Mouthpiece @ | 1.25 |
| Kellogg or Western Elec. Local Battery Ind. Coils @ | .40 |
| Monarch Local Battery Ind. Coils @ | .35 |
| Western Elec. No. 20 desk set with W. E. No. 315 3-bar 1000-1600 or 2500 ohm inside connection signal set @ | 10.00 |

**Write for Bulletins**
**REBUILT ELECTRIC EQUIPMENT CO.**
**1940 West 21st Str., Pilsen Station**
**Chicago, Ill.**

**J. G. WRAY & CO.**
**Telephone Engineers**
**Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies**
J. G. Wray, Fellow A. I. E. E.
Cyrus G. Hill
Rm. 2130 Bankers Bldg., Chicago

COFFEY SYSTEM & AUDIT CO.
Exclusive telephone accounting since 1907.
Certified Public Accountants.
We install the well-known
COFFEY SYSTEM
Audits—Rate Cases and Special Work.
A Central Accounting Department.
454 Consolidated Bldg., Indianapolis, Ind.

**Make Your Directory a Source of Income**
*Write for Particulars*
**J. H. WELKER**
McKinley Block, Canton, O.
Telephone 8009
**DIRECTORY ADVERTISING EXCLUSIVELY**

**GEORGE V. GOULD**
**Management Engineer**
Research. Personnel Analysis. Efficiency Methods. Waste Elimination. Reduction Costs for Utilities.
Member S. I. E. Box 1284, Indianapolis

**REBUILT**
**Telephone Apparatus and Exchange Equipment Saves You 30 to 50 Per Cent—Without Sacrificing Quality or Efficiency in the Least.**

**WHY** BECAUSE it is all up-to-date in design—of the best and most reputable manufacture—and is in most cases generally better than the majority of equipment you now have in service.

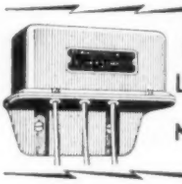
Our Stock Is Immense—Magneto or Common Battery—including Switchboards—Switchboard Apparatus—Telephones—Protection Equipment — Cable —everything you need for the installation of a new exchange or maintaining your present one.

Twenty Years Successful Operation of this Department in connection with our business puts it past the experimental state—Quality and Price have made our customers permanent—it will pay YOU to investigate.

Ask for Free Bulletin. Address
**PREMIER ELECTRIC COMPANY**
3800-3810 Ravenswood Ave.,
CHICAGO, ILL.
"Rebuilt" when connected with Premier means something.

We will sell your
**Telephone Directory ADVERTISING**
or will publish your directory complete
**L. M. BERRY & CO.** DAYTON, OHIO

**ACCOUNTING**
**HERDRICH AND BOGGS**
Certified Public Accountants
Specializing in Telephone Accounting and Rate Cases Since 1918.
901-7 Continental Bank Bldg.
Indianapolis, Indiana


**CHAPMAN**
**LIGHTNING ARRESTERS**
MADE BY
MINNESOTA ELECTRIC CO
MINNEAPOLIS, MINN.

Send for free sample and prices on
**UNIVERSAL DROP WIRE INSULATORS**
Universal Specialty Company
711 Poplar St., Terre Haute, Ind.

# RELAYS

**W. E. Co. No. 189-D** on No. 706-A, 717-A and 711-A mtgs. (per relay) ..... **$.50**

**Stromberg-Carlson No. 190 type,** any resistance (each) ..... **.90**

**Kellogg No. 600 type** (each) ..... **.75**

**Buckeye Telephone & Supply Company**
**COLUMBUS, OHIO**